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BUS TRANSPORTATION IS PROGRESSING RAPIDLY

Are YOU Keeping in Touch With the Developments?

Traffic Congestion in Our Large Cities Will Make the Use of the Motor Bus Obligatory. Inefficiently Operated and Individually-Owned Vehicles in Larger Centers Will be Forced to Give Way to a Systematized Service. Rural Routes Offer Unusual Prospects for the Live-Wire Type of Dealer

By ALBERT G. METZ

ONE of the greatest developments now lying before the automotive industry is presented in the motor bus transportation field. The motor bus has come to stay—regardless of the difficulties which have accompanied its quick growth and its somewhat crude beginning. And, one cannot gainsay that the rapid growth of bus transportation has not been accompanied with much antagonism from various quarters. The errors which have been made by the individual operating his first bus; the inefficiency exhibited by the host of lines failing to give a regular service; the lack of organization and proper management; the divergency of opinion as to what constitutes real service; the use of vehicles unsuited for the purpose; the lack of a thorough investigation as to the profitableness of a proposed line and in the majority of cases the temptation to grab the cream of the business regardless of service rendered, have all been responsible for the somewhat fluctuating progress made by the motor bus within the past four years.

During 1921 a great many motor buses were placed in service. It is estimated that there are about 25,000 buses operating daily in this country. Many of these are rendering service to the public such as it has never known before. There are, however, many examples of inefficiency in operation by nondescript companies, using equipment which is neither safe nor comfortable. Such companies obviously do but little towards expanding the bus service in their respective localities, nor do they help to improve the transportation situation in general. Usually a few such companies breed more discontent

than a number of well organized companies can successfully counteract by honest effort. It is not our purpose to here reiterate the many unsatisfactory circumstances which attend some of the present wrongly operated bus systems, except for the purpose of stating that these conditions are bound to exist in any business which has grown so rapidly and which has been accompanied by such little regard for the fundamentals which are so necessary to the success of any organization that hopes to become a public necessity and at the same time realize a profit on its investment.

But these mistakes are being eradicated and corrected gradually. It will take time to overcome the prejudice which has been built up against the motor bus from certain quarters, and it can be most favorably overcome by the industry itself; by the careful application of motor buses in the future and by the correct interpretation of the requirements of the field.

The Bus Has Come to Stay

In other words the motor bus has not arrived just for the time being or as a fad of some sort or other. It is rather a well-established industry, fathered by the automotive interests. In the minds of some electric traction officials and manufacturers of trolley equipment the thought is still harbored that the traction business will come back and that motor buses, unable to keep the pace set by the traction companies, will be relegated from the field. This failing on the part of some of the traction companies and the builders of traction equipment is but natural. Some of the concerns building street rail-

way equipment view the bus as a makeshift, which is making good because general business conditions render it impossible for the street railways to increase their facilities. However, as soon as general business takes a decided upward trend, they believe the bus idea will be discarded. This is the tenor of the feeling expressed by street railway people during personal interviews made by the editors of this publication.

Most assuredly the traction equipment builders will obtain more business as general conditions improve, and they are improving rapidly. But they will not obtain the volume of business which they now expect for various reasons.

First: Traction companies know that the financial burden which most of them now carry cannot be reduced by further expenditures of capital necessary for laying rails, setting poles, running overhead wires, cables, etc.

Second: Extensions of service by rails call for maintenance which is greater than the cost of any well organized bus line would require.

Third: The mobility and flexibility of the bus cannot be obtained by any other form of transportation which is dependent upon overhead wires and tracks for operation. The motor bus is an individual unit of transportation and, as such, does not depend on a central source of power. It, therefore, follows that the efficiency of the bus can be continuously and effectively realized because of its adaptability to varying conditions.

Fourth: The necessity of decreasing traffic congestion in our large and medium-sized cities.

Fifth: The operation of bus lines in residential sections where the laying of trolley tracks would be barred.

It is evident to anyone who has studied traffic conditions in some of our large centers of population that traffic congestion must be reduced. Most of the congestion is caused by the continuous necessity of stopping all traffic when passengers are taken on and discharged from trolley cars. With the bus the passenger is taken on and discharged from the curb, while other traffic can continue uninterrupted.

The bus will eliminate traffic congestion to a remarkable extent on such streets where the width of the street is insufficient to accommodate the present trolley car and any two other types of vehicles abreast. On such streets, particularly, the traffic is usually slow moving because of the frequent stopping of the trolley car. In such cases running buses parallel to the trolley tracks would not remedy matters. From such streets the trolleys could be eliminated, or at least, the greater part of them, and their places substituted by buses.

Naturally, all such moves must be carefully planned and can only be executed under the operation of one management.

The Cost of Operation

The question of the greater operating cost of the motor bus in comparison with the electric traction company is always made the point of issue when this subject is discussed.

What must be kept in mind, however, is that the motor bus offers a means of service that cannot be duplicated by the trolley cars. It is the convenience which the bus offers and for which the public is willing to pay that makes the bus attractive to the public. This subject is ably discussed in another article presented elsewhere in this issue. One thing must be borne in mind by the prospective bus

owner, and that is, that the question of fares does not really concern the bus rider as much as the kind of service he expects to get. In other words, if the prospective line starts business with a high-grade equipment and a schedule that can be relied upon, the rider, as a rule, does not object paying a ten-cent fare; whereas, if the line has the earmarks of a jitney service, the rider immediately rebels at paying a higher fare than the nickel. In passing it might be stated that no bus line can ever hope to make a profit and increase the scope of its service under nickel fare conditions, especially if it attempts to operate high-grade equipment. On the other hand, cheap equipment is bound to cost more in the end, because it will not withstand the heavy wear and tear and because the one-man, independently operated bus is usually worked to the limit. Overloading is one of the chief reasons for the untimely end of many otherwise potential bus lines. It is a common sight to see a fifteen to eighteen-passenger bus loaded with thirty passengers. Such overloading does not, of course, contribute to the life of the chassis. Such treatment not only shortens the life of the vehicle, but shortens the life of the bus service. Frequent trips to the repair shop, thus placing the bus out of commission for a time, only helps to depreciate the service in the eyes of the public, besides unnecessarily increasing the operating expenses.

The foregoing is written as a preface to the articles appearing in this issue dealing with the motor bus subject. Every dealer should become thoroughly familiar with the passenger transportation conditions existing in his particular locality.

Furthermore, the dealer who sells motor buses should be very careful, in selling this form of transportation, not to overestimate the profits for the prospective owner. The owner must not be led to believe that there is all profit and no ex-

penses connected with a bus line. The owner should be encouraged to keep accurate cost records so that he will know accurately how much his expenses are and what his profits should be. Many individually operated bus lines have come to grief because the rate of fare charged was too low for a legitimate profit. Unless accurate cost figures are kept there is no means at hand of checking up this factor.

Proper attention to lubrication cannot be impressed too strongly upon the prospective bus operator. A certain period should be set for every bus in active use, during which time the machine is gone over thoroughly and oiled, thereby saving a great deal of unnecessary repair work. Here again the dealer can establish a service which ought to not only be a paying proposition, but a means of keeping in close touch with the work the bus is doing, at the same time obtaining information which will be of distinct benefit to him in lining up similar deals.

Hornberger Succeeds Brownell as CCJ Advertising Manager

We announce with regret the resignation of Mr. Brownell as advertising manager of the CCJ. Mr. Brownell has accepted a call from the Christian Herald, which publication he joins with the well wishes of the entire CHILTON organization.

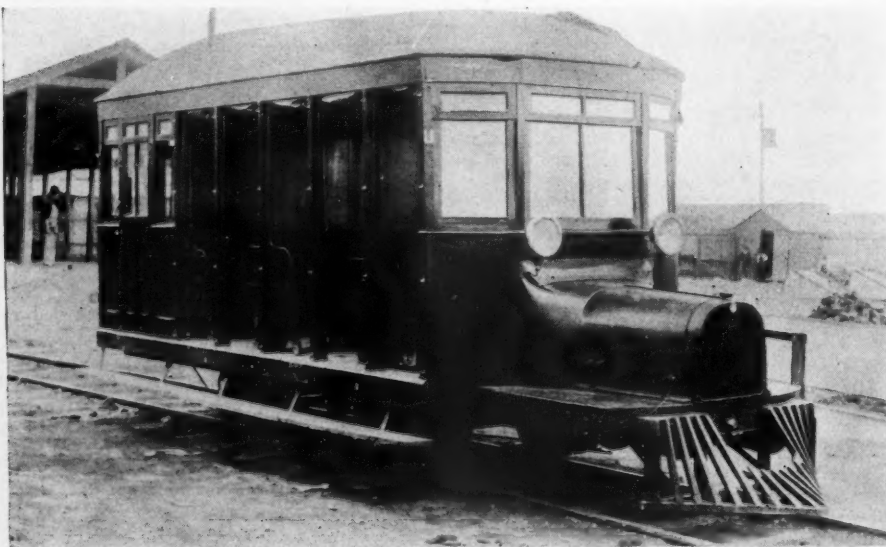
His work will be taken up by Henry L. Hornberger, who has had considerable experience in both the automobile and



Henry L. Hornberger

advertising fields. Mr. Hornberger's business record dates back to 1896, from which time until 1904 he was reporter and editor of Philadelphia newspapers. From 1904 until 1912 he conducted his own advertising agency in Philadelphia. Following that, he was account executive of the Geo. Batten Advertising Agency; vice-president and general sales manager of the Globe Rubber Tire Mfg. Co. for over a year, and recently with the John Price Jones Corp.

His well-rounded experience, plus his native ability in the advertising and sales fields eminently fits him for the important position of advertising manager of the COMMERCIAL CAR JOURNAL.



This Unique Motor-Driven Street Car is Operated Profitably in Mexico

The chassis weighs approximately 6600 lb., with a wheelbase of seven feet. The transmission is adjusted with the original rear axle of the Dodge Bros. chassis, and sprockets for the chains are placed in the naves of the wheels. The diameter of the wheel is 22 in. With this car the railway company claims to be able to carry 40 passengers, and with the addition of a trailer, 80 can be transported. The 18 mile trip from Mexico City into the interior takes about an hour. The operation of the motor-railroad has been so successful that the railroad officials in Desague, San Rafael and Atlixco are also studying closely the possibilities for similar transportation in their territories.

PLACING THE BUS IN ITS PROPER SPHERE

This Industry Must Show the Electric Railway Companies the Advantages of the Motor Bus and How the Bus Will Reduce Operating Costs of Certain Classes of Service

Must Have Constructive Co-ordination Rather Than Destructive Competition

By WALTER JACKSON, Consulting Engineer

THE writer on steam turbines seldom fails to refer to the time of the late Hero of Alexandria, a trifle more than 2000 years ago, and one who presents a paper on the road transportation of passengers must face the temptation of dragging forth the ghosts of Egyptian sledges, Roman chariots and English stage coaches; but I will put the pleasing provocation by and plunge at once into a period no further back than that of our great-grandfathers. In the decade of 1830-1840 some serious and creditable efforts were made to produce a trackless, self-propelled vehicle. Indeed, as early as 1828 Sir Goldworthy Gurney's steam coach was making the 9 miles between Gloucester and Cheltenham in 45 to 55 min. Three years later the Ogle-Summers steam carriage was fleetingly along the highways at 30 to 35 m.p.h. utilizing a modern boiler pressure of 250 lb. per sq. in. Inventor after inventor came into the field within the next few years, but through the influence of the railroads, there was placed upon the statutes the absurd provision that each and every steam engine operated over the public highways should be preceded by a man carrying a red flag, at a walk, of course. The rate of locomotion, ironically termed "speed," was limited to 4 m.p.h., and railroad shareholders and horses were saved from fainting fits by permitting such vehicles to run only in the darkling hours of 10 P. M. to 6 A. M. College debating clubs may still argue whether legislation really can block the bus of progress very long, but here is a record of legislative obstruction that proved effective for more than two generations.

The net result was that, both here and in England, the field of passenger transport was left to the steam railroad and the horse-drawn omnibus. The latter was first succeeded by horse-drawn railway cars, for those were decidedly not the days of smooth paving, and then by the cable and the electric railways. For a time, it seemed that the electric railway would become the sole means of public utility

dulge in watchful waiting, but blithely went on to build thousands of miles of track through districts that did not produce enough business to meet operating expenses alone.

There was 47,941 miles of electric single trackage in the United States in 1919. In 1920 the mileage showed a decrease for the first time in the history of the industry, being 47,705 miles, or a loss of 236 miles. The figures for 1921 may show a still greater loss. These declines are due to the deliberate abandonment of non-paying lines, principally of systems in receiver-ship that are not compelled to continue to observe original franchise stipulations.

In cities so large as Bridgeport, Conn., and Des Moines, Iowa, we have seen extended periods of idleness on the part of the local traction systems. In

the one case it was the hope of the traction company to compel the absolute elimination of jitney competition; in the other there was a desperate effort to secure a higher rate of fare. Like scenes are being enacted in other cities. One would not expect sane communities to prefer to exchange even a fairly reliable street railway under one corporate management for the uncertain, hard-to-please but far from coy jitney man. Yet they have shown themselves willing to put up with atrocious jitney operation for weeks and months rather than submit to the demands of the street railway. In short, the lack of goodwill toward the electric railway blinds the community to settling its transportation problem upon the common sense basis of all mass transportation in a community, regardless of the manner of propulsion, being under a central, co-ordinated manage-

In his paper, read before the society of Automotive Engineers during their Annual Mid-Winter Meeting, Mr. Jackson points out in a concise manner the field which is open to the motor bus and some of the problems which face the industry.

We earnestly request every dealer and manufacturer who is selling or planning to sell motor buses, to read this paper, as we believe it will help him understand more clearly the situation which today confronts the traction companies. It should establish in his mind the fact that the indiscriminate attempt on the part of individual operators to free-lance at the expense of already existing traction lines will not be conducive to an increase in number of motor bus sales. In this connection, he says: "What we should strive for is to secure constructive co-ordination rather than destructive competition, realizing that as transportation is inherently a monopoly and should be under one direction, whether the vehicles are propelled on a track or on tires, by electricity or by internal combustion."

In this paper, the question of fares is also thoroughly gone into and conclusively shows that the nickel fare, which is being charged by the jitneys for short hauls, does not begin to cover the actual expenses accruing in the operation of a high-grade motor bus service.

transport in city and suburban areas but, after two frenzied decades of expansion, it was seen that while electric traction is technically right there are plenty of places where it is financially wrong.

Old-timers Not Entirely to Blame

It would not be fair to criticize the old-timers too severely for the construction of uneconomic lines. They knew no other form of mechanical propulsion that would relieve them of the great cost of power-stations, sub-stations, distribution systems and other rooted structures that go with the humblest electric railway. When electric railway building was at its peak, the gasoline vehicle was in its first stages. The electric traction men were not in the same position as the horse-drawn omnibus operators of London, who had to seek something faster and better without recourse to the rail. They refused to in-

ment. So far, some electric railway companies have not seen their opportunity to absorb unto themselves whatever special advantages the bus has for attracting traffic and reducing the operating costs of certain classes of service. They have actually given the impression by their antagonistic attitude that the field of the motor omnibus is greater than it really is on the basis of present-day development, and they are encouraging the formation of motor bus companies whose promoters seem very much in the dark as to the requirements of an exacting public.

It is significant that, while no important city has given up its railway system to change to the jitney bus, the substitution of motor buses for the cross-country trolley car seems to be meeting with public favor. This class of trolley line usually has a single track, which handicaps its schedules; and, as most of its former patrons own motor cars, the clientele tends to decrease year by year. Besides, the very advent of improved roads is a bane to this class of trolley in another direction, namely, that of realignment to new paving levels. Few such railways can afford to get out of the dirt and into the paving; so they quit. The abandonment of several hundred miles of track by the Eastern Massachusetts Street Railway Co. alone is a forerunner of what other railways with cross-country lines on public highways are facing.

The development of both electric and steam railways in this country has been on such a grandiose scale that one would hardly expect to find any community of considerable size without transportation service. Nevertheless, there has been already an imposing development of motor bus transportation in non-competitive districts. Out of a city like Poughkeepsie, N. Y., for example, a number of individually owned motor bus enterprises are operated which tap territory without railway service of any kind. There are literally thousands of one-man services of this kind that are performing a most valuable function. They produce a living for men who are willing to work 12 to 16 hr. per day, but would not do for companies from whom the community would demand better vehicles and more frequent service. There must be some deep-rooted belief that individuals in the public transportation field are deserving fellows entitled to get away with anything; whereas, company organization at once implies that there are great profits for somebody somewhere, this implication meaning higher standards and higher taxes.

Jitney Competition

So far as jitney operation is concerned, that is here today, gone tomorrow and back again day after tomorrow. Endless state and municipal measures have been passed at the behest of both the railways and the public and, I may add, even at the behest of jitney men who have achieved the status of a vested interest and want protection against later comers. But much of this legislation seems to fall to the ground whenever the local street railway company and the administration disagree. One day sees all the second-hand cars in town soliciting patronage, usually

at a lower fare. The news travels and a hegira sets in toward the new jitney. Thus, in the recent Des Moines trouble jitneys thrown out of Connecticut actually were driven overland to Iowa to obtain their share of the abnormal patronage.

Overland Motor Buses

It has been more difficult to regulate the competitive overland motor bus than the city jitney. The exclusive franchises that electric railways lean upon in municipalities do not apply to the country, where the electric railway may be a blend of city, highway and right-of-way operation. Often enough, the buses do not parallel the railway all the way but only in part. If they reach, in addition, off-side districts not served by the railway, it is hard for a state commission to say whether the proposed bus route is entitled to a certificate of convenience and necessity. Most of the overland bus companies, those in California and Washington, for example, charge lower fares than the railways, but the chief reason for their getting the business seems to be that they come closer to the patrons' origin and destination than the railways. In California, particularly, the delights of the climate are a strong temptation to outdoor riding.

As already hinted, the only curb on these cross-country or overland bus operators is that they must in a growing number of states like Connecticut, New York, Pennsylvania, Illinois, New Jersey, California and Washington obtain certificates of convenience and necessity. This curb is of varying degrees of value, dependent upon the viewpoint of the commission. In one case the Illinois commission granted a certificate permitting competition against an electric railway because the latter had not met the commission's ideas of a proper standard of service; but the same commission refused a certificate to another applicant who wanted to compete with an electric railway giving satisfactory service. Commissions are inclined to give certificates in cases where a large part of the run will not be in competitive territory; and in competitive territory they may grant operating rights because of the lower fare offered.

Motor Bus Legislation

The latest motor bus legislation in which both city and country operation are placed under the state commission is that of Connecticut and of New Jersey. In the latter state, however, the commission exercises no control over operators who had regular routes before the time of the passage of the act, March 15, 1921. The question now before the courts is whether this exception constitutes a vested or property right that can be transferred to a successor. In the first case brought up the Board of Public Utility Commissioners granted this succession right to one Carl A. Becker, but the Public Service Railway Co. within whose area Becker operates has appealed the case. The point made by the commissioners was that the bus operators active at the time of the act had been regulated already as to number and routes by the local municipalities, and that they were therefore, presumably, fulfilling a work of convenience and necessity. Un-

der their conception of the law entirely new petitioners can apply to them for routes, provided they have obtained approval previously from the local governments.

The cities of Connecticut never undertook to license public utility vehicles; so the new legislation did not deprive them of any powers theretofore exercised. All that a jitney operator needed was the nominal state license for a public utility vehicle, and all the regulation he endured was what the police chose to exact, as was evident particularly at Bridgeport. Theoretically, the Connecticut Public Utilities Commission is not obliged to pay much attention to what the different cities may desire, but practically it is under this obligation. In the city of Hartford, for example, the elimination of the jitney met with general approval. Contrariwise, the large working population of Bridgeport was bitterly opposed to paying a 10-cent fare on the cars in view of the fact that it had thitherto had a 5-cent fare on the jitney buses. Preceding the passage of the state law, the Bridgeport council had agreed to relegate the buses to streets on which there were no car tracks, so far as that was physically possible. Despite this handicap the buses continued to get most of the traffic. When the state commission endeavored to put these jitneys out of business the latter adopted one subterfuge after another, such as accepting tickets from alleged club-members, besides securing stays from the courts. The commission itself, recognizing the hardship of a 10-cent fare, has ordered lately a 5-cent short-ride fare and threatened to grant additional bus licenses if the electric railway does not give satisfactory rates and service.

Public Consideration

I have gone into these nearby situations at some length to indicate that, while the regulatory bodies are gradually assuming control of motor bus operation, it does not follow that the electric railways can afford to show indifference to the public. The people will find some way of getting what they want, sooner or later. It seems incredible that the electric railways themselves have been among the opponents of legislation that would grant the common carrier under discussion the right to run motor buses. They actually feared that such recognition of the transportation usefulness of the motor bus would make all of their own precious investments passé. This was topsy-turvy reasoning. The bus did not need this legislation to prove what it can do. Thus far not more than a score or so of our 800 to 900 operating railway companies have undertaken motor bus operation, but even these few pioneers give a clue to some of the valuable results that can be attained with the motor bus. One large city railway company has installed buses over a poorly traveled route to save the expense of re-tracking and repaving; another has given up a dangerous run along a steep river bank to follow a shorter line on the highway; a third has cut down the losses on a roundabout electric railway by offering a shorter, faster alternative bus route; a fourth has found that a bus-line makes it

unnecessary to disturb a cherished public park; a fifth finds the bus the least costly medium for tying together two important rail routes; a sixth has made one loop out of two former trackways; and several others have found the bus a most desirable vehicle to ward off the cost of track extensions until new business justifies the old burdens.

We are all familiar with the splendid organization of the Fifth Avenue Coach Co., New York City, that combines both technical and sales leadership in its work. But this company, like the other double-deck bus operators in Detroit and Chicago, is doing a work somewhat apart from the usual organization that is responsible for all the mass transportation of the community.

Summarizing the present situation as to the motor bus, we have the unreliable competitive jitney; the rapidly growing cross-country bus, sometimes competitive and sometimes creative; the beginnings of motor bus operation by electric railways; the de luxe double-decker; and, finally, the "on call" motor buses and char-a-bancs that may some day achieve the same popularity they have attained in England.

The Future

Will the city and suburban electric railway disappear altogether and the steam railroad be discontinued in part; or, will the increase in motor buses be due more to the creation of new business because of their unlimited flexibility? The general public, unfamiliar with the cost of either mode of propulsion, cannot be blamed for thinking that the trolley car is doomed when it observes the jitney charging half the fare and making 50 per cent greater speed; but the automotive engineer can be blamed if he fails to see that these two forms of transportation are not compared so easily as that.

The electric railway of today is the product of two generations of corporate life. During those generations it has accumulated a number of unwholesome factors that place it at a disadvantage in competition, entirely aside from the question of engineering merit. There is, for example, the fundamental franchise obligation that a certain amount of service must be given regardless of traffic, an obligation from which the jitney is almost or entirely free. There is the paving obligation from which the very jitney that runs over that paving is free. There is that host of taxes on costly buildings and land, on income, on the corporate form, sometimes even on trolley poles or cars, from which the jitney suffers next to nothing. There is the curse of the same fare regardless of the length of the ride, while the jitney travels no farther than the fare will cover.

These are some of the burdens for which the railways themselves are not responsible to any degree, and they are burdens that would be paralleled in the long run by any regularly organized motor bus company. The Fifth Avenue Coach Co. is not only the oldest and largest motor bus organization in the United States, but it is the one that has gathered unto itself the largest tax bill in proportion to earnings. And the gallonage tax is yet to come! Since these are burdens imposed by the state, they will become equalized

in time; so they present no really great danger for the older utility. In truth, the burdens that the electric railway has accumulated without the help of government are far greater. If these are not shaken off or greatly reduced in weight, the motor bus in independent well-monied hands will prove a real danger and supplanter in many of the smaller and medium-sized communities. First of all, the failure in the past to set aside amortization and depreciation funds to care for advances in the art has led to excessive replacement needs at this time. Many companies are compelled to continue to operate with obsolete equipment because they cannot borrow the money for efficient apparatus, thus suffering much higher operating costs than the actual state of the art makes possible.

Rates of Fares

In the second place, in seeking a rate of fare that will restore their credit, electric railways have valued their property on a "reproduction-cost-new" basis and then sought also a war-time rate of return on this valuation. The consequence, in a number of cases, has been that the resultant fare required is so high as to frighten off an appreciable proportion of the traffic. This brings us to the vital question, Have electric railway fares reached a point where the motor bus can compete against and supplant the electric railway? I say without hesitation that any small city electric railway charging a 10-cent fare today is absolutely vulnerable to such competition, should the state allow a capably organized company to come in. There are some two score communities of that character charging a flat fare of 10 cents, and between 40 and 50 cities or towns charging a 10-cent cash fare and 6 to 9 cents for a ticket.

The railways in 70 to 80 communities charging 8 and 9-cent fares are also in danger, provided the length of route is within 3.0 to 3.5 miles. The 7-cent and 6-cent street railways hardly could be touched by a motor bus company so long as both had the same scheme of charging

one fare regardless of the length of ride; but, if the motor bus operators were wise enough to do business only on a distance fare basis from the start, they would be able to begin at a 5-cent minimum for say 1 mile. Therefore, it will be seen that unless the electric railways in such districts are willing to write down their valuations as remorselessly as a merchant writes down his out-of-date stock, they will not be saved by their inherently lower operating expenses. Here I may be taken up short by the over-enthusiastic bus advocate who does not like that last phrase about "inherently lower operating expenses." Nevertheless, it is true.

Motor Bus Expense

It has been my work to analyze a great variety of motor bus expenses, both real and theoretical. The real set-ups of actual expenses have been chiefly in Great Britain, where the motor bus is a valuable and important part of the mass-transportation system and is almost always in railway hands. Although the basic costs differ materially from ours in at least the item of fuel, we know that they are based on actual and not theoretical conditions. When we look for the corresponding items in cost set-ups in this country we find, with few exceptions, that a considerable number of items have been overlooked. For example, many of the estimates show a cost of 1 cent per seat-mile, whereas inclusion of all legitimate items in company operation would bring the cost to 1.5 and even 2.0 cents per seat-mile. The accounts of electric railways operating motor buses confirm this estimate. Double-deck buses would be somewhat cheaper, of course, on the seat-mile basis. On the basis of the few well-kept accounts available in the United States it would seem that a 10-cent fare is the right fare for high-grade motor bus service covering rides in excess of 3 or 4 miles average length. Only one-man operation in congested streets and within a route length of 2 miles offers the opportunity for anything like a 5-cent fare.

The statements of the average jitney operator are poor guides to the correct



This New Duplex Model AB Motor Bus Provides for Twenty-Three Passengers and Ample Standing Room for Eight Additional Passengers

The Duplex Truck Co., Lansing, Mich., describes this job as containing only units that have been designed, built and balanced for safe, comfortable, dependable and economical passenger haulage. Two very interesting items of equipment included in this bus is a Type 2, Ohmer fare register and a standard Cleveland fare box fitted with a substantial money drawer and Yale lock.

cost estimate of a genuine motor bus service. The jitneur works many more hours per day for himself than he would work for others, in running the car and in taking care of it. He has a direct incentive to collect all the fares and to waste no materials. He is just as liable as not to store his bus in the open. As for standard of cleanliness, heating and maintenance, it does not exist and therefore costs nothing to get. The statements of builders are necessarily more general. It is right for them to expect a certain number of miles per gallon of gasoline and lubricant and to anticipate a certain maintenance cost and depreciation per mile on the assumption that the operator will be careful and that he is equipped with proper facilities. It is not right for the prospective purchaser to accept these estimates unless he knows he can fulfill the builders' expectations in those two respects.

Daily mileage is an important element in determining costs. There is a wide difference between the cross-country vehicle that will make a practically non-stop run over a perfect highway with a good load between its terminals and the vehicle that will be used in any of the many varieties of city service. It makes a difference

whether one runs 200 or 100 miles per day. The bus may be perfectly capable of doing 200 miles, but will there be any necessity for it in the given situation? As previously indicated, a number of uses for the motor bus lie in the operation of extensions or crosstown services where traffic is thin and it is cheaper to have long lieovers than to keep the vehicle shuttling back and forth. As a matter of fact, the operating cost of a modern safety one-man car is little more than half as much as the operating cost of a motor bus of equal capacity. When we come to larger units, such as two-car and three-car surface trains, the disparity is just as great, aside from the fact that the same capacity in buses of single-deck type, in any case, would not be available in the same area. The superiority of the best motor bus to the best street car does not lie in any saving in operating or running costs. It lies in the ability to meet situations, some of which already have been described, that no track-bound vehicle of any type could solve. We cannot expect the bus to replace the car on a large scale except where the electric railway deliberately commits suicide. We can expect it to do what it already has done in Great Britain, to put

a stop to all trackage development except extensions that will have heavy travel from the very first day that such routes are completely opened for the regular transportation of passengers.

The great sums that have been put into electric railways are not to be wiped out forthwith, although they are to be cut by the lopping off of weaker lines and small systems. But the future does belong almost entirely to the motor bus because it makes possible the investment of capital in direct proportion to the business available instead of demanding almost as much investment for 50,000 as for 500,000 car-miles per annum. It is not necessary to assume the complete supersession of the electric city railway as a necessity for large motor bus development. The appetite of the people for transportation is far from satiated. What we should strive for is to secure constructive co-ordination rather than destructive competition, realizing that mass-transportation is inherently a monopoly and should be under one direction whether the vehicles are propelled on a track or on tires, by electricity or by internal combustion. Only in that way will each form of transportation find its true economic place.

A Typical Example of the Growing Popularity of Urban Bus Transportation

A Satisfied Public Permits Future Economical Expansion by Addition of Auxiliary Bus Lines. Read This Interesting Case of City Traction Expansion

Operation is Being Carefully Followed by Other Traction Companies

By A. V. COMINGS

ADoption of motor buses as feeders for the electric traction lines at Rockford, Ill., is a very interesting and important step in the development of this type of urban transportation facilities, for the traction line at Rockford is one of a large number of similar properties controlled by Hodenphyle, Harding & Co., 14 Wall St., New York. With two other traction companies in this group, Jackson, Mich., and Akron, O., already in line with motor bus feeders for the existing electric lines, it would seem that this group, one of the largest in the country, is converted to the essential utility and efficiency of the motor bus for this service and will extend its use on many other of its properties.

General Manager "Bill" Sparks, of the Rockford lines, made a rather significant remark to me relative to the installation of the buses in that city.

"The buses," he said, "will be run as feeders to our electric lines at first. But eventually, they will be run all the way down town!"

Which, coming from a man who has made his life's work the efficient man-

agement of electric railway properties, is quite indicative of the trend of opinion among the more alert executives in this field.

Rockford Traction History Shows Development

Rockford furnishes one of the best examples of the development of modern urban transportation among all the cities of the United States, and the introduction of the motor bus as an auxiliary to the electric railway system is a very logical step in this development.

Thirty years ago Rockford had a population of about 30,000, rather compactly gathered within easy walking distance of the business center of the city. Horse-car lines radiating from the business district to the approximate four corners of the city took care of the movement of population on its various business and social meanderings. The tinkle of the street car horse's bell was a familiar sound in those days, and life was not speeded up to the tempo it has assumed in these halcyon days of jazz, moonshine and wide open muffler cut-outs.

The Rockford lines were among the first half dozen in the country to be electrified, for shrewd capital saw the future that was even then impending for this hustling manufacturing city. At first there was little extension of the original trackage, for the manufacturing plants, which even in those days had made Rockford one of the well known manufacturing cities of the country in the machine tool, agricultural implement and furniture lines, were mostly within easy walking distance of the original horse-car lines.

Then the city began to spread out, first to the southeast, which is today far beyond its limits of a few years ago, then to the north, and then to the southwest. Thousands of residences followed the building of new factories, and new residence districts of a better type were developed in other parts of the city, giving it an almost equal expansion in all directions, with a present population of 65,000 within the city limits.

It was possible in those days to secure capital for extension of the electric lines and for the purchase of better cars as the demands increased, and eventually the

Rockford lines became a part of an electric transportation system which extended, through interurban lines, first to Belvidere, on the east, then to Beloit and Janesville on the north, and to Freeport on the west.

The war brought about the same condition with the Rockford lines that it has brought everywhere, revenues small in proportion to the mounting expenses, and fares went up eventually.

But the war also brought Camp Grant to Rockford, and placed it on the east of Rock River, several miles below the city.

The transportation of tens of thousands of soldiers and civilians to and from the camp and around the city brought the first real competition the street car company had ever had from motor buses and gave to Rockford people the first opportunity of judging for themselves how comfortable and reliable motor buses may be when properly run.

The Fay Motor Bus Co. put on lines all over the city and to Camp Grant, running on regular schedules, safe, comfortable and thoroughly satisfactory in most ways. For the first time Rockford people rode in public buses and they liked it.

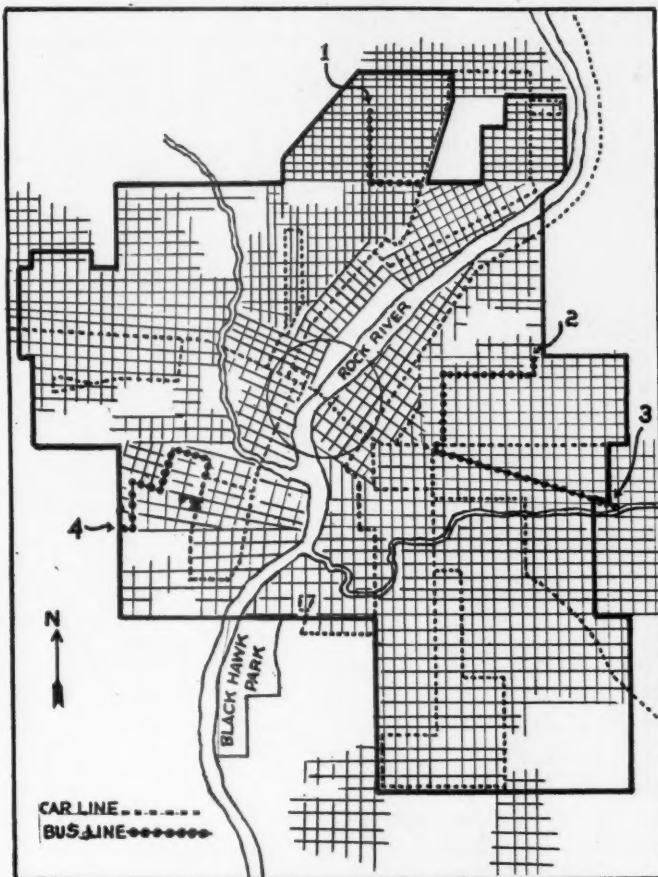
Trolley Company Runs Buses as Feeders

So well did they like it, and so favorably did it compare with the electric lines, whose cars were none too modern, and whose tracks were not of the smoothest in many places, that when the street car company's franchise expired last year the city came within a very small margin of giving the Fay Motor Bus Co. a franchise to handle all its transportation. The street car company fought this possibility with all its strength, however, and was given a renewed franchise, including a right to run its own bus line feeders.

So the company's engineers and traffic men got busy, and four bus lines were decided upon as auxiliary to the present system, and these will be added to as other sections of the city grow larger and demand transportation facilities. It is doubtful if the Rockford electric lines are ever in the future augmented by a single mile of trackage, for the city is ideally located for the economical use of bus lines.

For the most part, Rockford is built on level ground, and its most important streets are paved with brick or asphalt. Due to the foresight of a former mayor, E. W. Brown, the city owns its own hard limestone quarry, its own rock crushing plants and its own street making machinery, and most of the important residence streets are paved with a macadam pavement that has been put down to stay. It is noted among municipalities for the high standard of this kind of pavement it has put down.

A reference to the map herewith shows



Map Showing Bus and Trolley Lines Operated in the City of Rockford. Details Are Contained in Article

how the new bus lines serve as feeders to the street car system.

Route No. 1 goes through the center of a section of the north end of the city that has grown rapidly within the past few years, and which has been without street car transportation save by walking eastward, a long walk for the majority of the residents.

Route No. 2 is in an older part of the city which has been sparsely built up till the last five years, and this service will prove very popular.

Route No. 3 bisects diagonally the section between two of the company's important tracks, serving a section on each side that has been built up for years but poorly served. It also reaches to a new section

that lies just outside the city limits, a section hitherto without transportation of any kind.

Routes 2 and 3 will be run as one, the buses starting from the far terminals, crossing the State and Charles street lines, at the "flatiron" corner where these two lines intersect, and continuing to the opposite terminals.

Route 4 is in the southwest part of the city, serving a section that has built up through the location of manufacturing enterprises in that vicinity. While rather an odd shaped route, it is designed to go through the most thickly settled portion of that section.

No attempt has been made in this map to show the actual streets, the cross lines merely indicating the general direction in which the streets run, and a general suggestion as to the density of population.

The main business section is included within the circle in the center of the map, and extends east and west of the river on State St., and south on Main St. just west of the river. There are other smaller outlying business sections, all served by car lines, and all these will benefit by the use of bus line feeders.

Buses similar to the ones described in the October issue of COMMERCIAL CAR JOURNAL as having been purchased for the Akron, Ohio, street car lines, will be used at Rockford. These buses are of steel, on chassis fitted with pneumatic tires. Seating room for twenty-five passengers is provided.

The development of the motor bus as an auxiliary to the Rockford street car system will doubtless be watched with a great deal of interest in transportation circles everywhere, as Rockford is a city typical of many others in the United States, and their success in Rockford will lead to their general adoption in many other municipalities.

Read the March Heavy-Duty Number



The Thousands of Miles Already to the Credit of This Two and a Half Ton Armleder and Two-Wheel Trailer Proves That the Sandy Roads Over Which This Outfit Travels Were No Hindrance to Its Economical Performance

The above shows how a Southern lumberman solved the problem of moving several pieces of lumber of unusual length. Two pieces, each measuring 12 in. x 12 in. x 52 ft., constituted one load. Each piece was satisfactorily delivered at its destination, which was separated from the loading point by nineteen miles of sandy road.

THE BUSINESS SIDE OF BUS OPERATION

Individual Initiative, Determination and Ability the Foundation of Success

By J. W. COTTRELL

SUCCESS or failure in bus operation depends upon the individual. That is the summing up of the situation as it appears in Camden, N. J. And to this statement let me add that bus operation, according to the views of those in it, is a business—not play, or a side line, or an easy road to wealth—a serious business giving good reward to some and sure failure to others.

There are about 130 buses running in Camden, N. J., and of this number 108 are operated by members of the Camden County Bus Association. This association was formed in September, 1919, by the owners of nine cars. The growth of the association was gradual and it was about a year before it became an active and important figure.

Association Purely Co-operative

The association does not own or operate any buses, but is a means of co-operation among the individual owners of buses. The headquarters of the association is located in a store at 325 Market St., and it was here that R. C. Dukes of the association gave information about it.

Gas, oil, tires and supplies are sold to members by the association at cost. It maintains a Lost and Found Department. Any article not claimed within thirty days is returned to the driver who found it.



One of Four Buses Connecting Camden With Williamstown

Beside local buses, running within the city limits, service is given to many suburban towns, among them:

Swedesboro	22 miles
Gibbstown	20 "
Williamstown	21 "
Berlin (on White Horse Pike to Atlantic City)	18 "
Medford	18 "
Salem	30 "

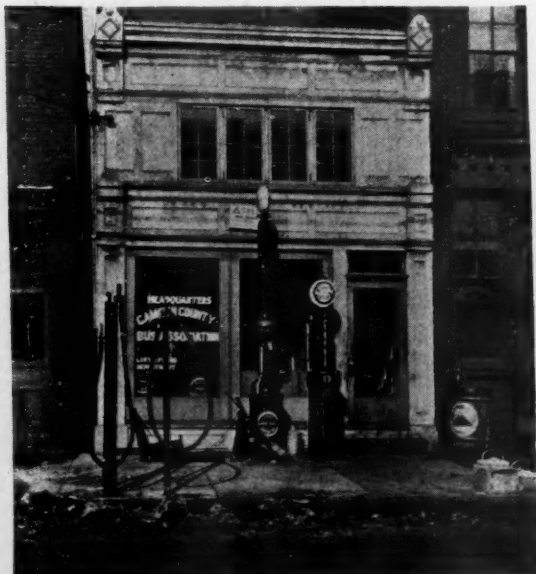
and also Bridgeton, Clayton, Merchantville, Gloucester and Haddon Heights.

Most of these buses run from the Pennsylvania R. R. Ferry Plaza in Camden, the New Jersey terminus of the ferry connecting Philadelphia and Camden. A smaller number run from the Kaighn Ave. ferry, which is operated in connection with the Reading R. R. between Philadelphia and New Jersey points.

Individual Operators Discouraged

An individual intending to run a bus in Camden will find his way beset with difficulties. There is competition with railroads and trolleys and often these are already competing with each other.

The route over which an individual bus may operate is fixed by the Public Utility Commissioners, a State body. Buses which were in operation on March 15, 1921, were allowed to continue, but since that time permission from the Public Utilities Commission has been required before a bus line could be started and operated. The Commission permit or



Left: Headquarters of the Camden County Bus Association, 325 Market St. Right: Bus on Federal St., Camden, Traveling at Schedule Speed Despite the Difficult Going Resulting From a Recent Blizzard

license covers the operation of the bus on the specified route and no change can be made without permission.

In addition to the Public Utilities Commission permit, a New Jersey license, or registration, must be obtained. Most of the Camden buses pay from \$25 to \$35. The City of Camden requires a license at a fee of \$200 and the buses on suburban routes must also have licenses in several of the towns through which they run. There is also a requirement that cars used for hire must be protected by a liability band, and busmen report the cost of such a bond as about \$450.

cents and a strip of eight tickets is sold for 50 cents; some busmen sell four of the tickets for 25 cents. These tickets, sold by the association, or by the drivers of the various buses, are good on any bus belonging to an association member. The tickets are turned in and "cleared" at the office of the association. Ticket sales are reported to be about 9,000 per day.

The fare on the trolleys is eight cents in Camden, and with each fare paid a receipt is given the passenger that the Public Service Railway Company will refund to the bearer 1 cent, "provided rates of fare permitted by the United States

named the "bull pen" and the scene of confusion, congestion and disorder certainly displeased and angered the company's customers.

The merits of the case, whether the corporation or the public were to blame need not be considered here. The fact is that there was and is a feeling (justified or not, according to the viewpoint) of ill will against the corporation, and the bus owners started with the public, largely, on their side.

But the continued good will of the public for the buses has been kept by courtesy and service.

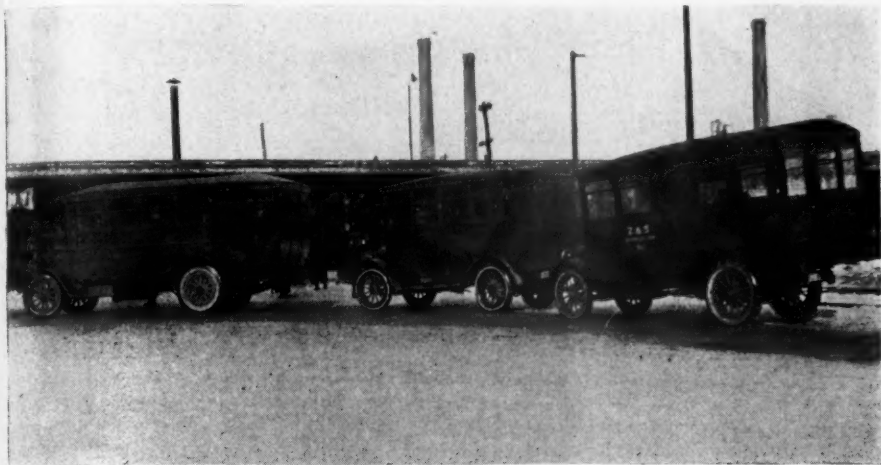
For quite a period the writer observed the buses at the Camden Ferry circle. This circle is the terminus of almost all of the lines and large numbers of passengers are taken on and discharged at this one point. One fact soon made an impression. Dozens of passengers spoke to the bus drivers on leaving, or more often on entering the buses. They had ridden with the same drivers often enough to get acquainted with them.

It seems only a little point. But the combination of Courtesy, Good Will and Success is after all not uncommon.

Service, Equipment, Bus Design

Are the buses standing up? Are the owners making out? How are the buses sold? How about service? To find the answers to these questions I obtained the ideas of owners and dealers.

The larger buses are standing up and



Section of Buses Circling the Camden Ferry Plaza Terminus

The schedule of the various licensed cars on a route is arranged by the Bus Association. For illustration there are 18 buses on the line to Merchantville. The schedule calls for a three-minute headway during rush hours, six minutes at other times, and twelve minutes during slack times.

The three-minute headway schedule applies to all buses. The number of the individual buses to drop out and the time to drop out after the traffic peak and the time to come on again for the evening peak is shown on a "Block Schedule."

Block 1 calls for operation all day.

Block 2 calls for lay off 9 a. m. to 3 p. m.

Block 3, all day.

Block 4, lay off 9.10 a. m. to 3.10 p. m., and so on to number eighteen.

In starting the schedule, Car No. 1 takes Block No. 1, Car No. 2 takes Block No. 2, etc. The next day Car 1 takes Block 2, Car 2 takes Block 3, and on, Car 18 moving up to Block 1. In this way the buses take all of the blocks in rotation.

Once the schedule is started it operates without further attention. This plan gives to the public a service conforming to their needs and it is fair to each and all of the bus owners and it saves operating costs by cutting down the number of buses running during slack hours.

The association has a starter on duty at the Pennsylvania R. R. Ferry to assist passengers, and furnish any information asked for by passengers, particularly about the time of the next bus to various suburban points.

The local fare of the bus lines is seven



One of H. L. Brewer's Buses at Kaighn Ave. Ferry Preparatory to a Run to Williamstown

District Court for the District of New Jersey are not sustained on final hearing." The company sells a strip of four tickets for 30 cents.

There can be no doubt that the buses have built up, in Camden, a very strong and valuable good will with the travelling public. And they started doing this with the very important advantage, to them, of much ill will against the local trolley company. Successive increases of fare from six to seven and then eight cents, service which the riders considered unsatisfactory, and the method of handling the large number of passengers at the Camden Ferry with a layout of platforms, gates, partitions and fences which was nick-

paying better than the smaller ones, is the general opinion. One make of truck rated at about one ton carrying capacity was used extensively, and, according to the statement of one member of the Bus Association, at one time 80 per cent of all the buses in use were of this one make. But overloading brought about many and serious troubles. A body seating about 15 persons was used and during rush hours 12 to 15 more were crowded in, standing up. Carrying at least twice rated capacity and constantly stopping and starting resulted in large repair bills and frequent lay-offs for repairs.

Larger trucks of one and one-half to two tons carrying capacity with larger

bodies than the one-ton trucks are in use and their number has increased. One bus owner said that the earning capacity of one of these larger trucks was, of course, more than a smaller one and the cost of running it was only **one-half** as much as that of an **overloaded** one-ton truck.

Having learned that almost all of the buses were sold on time, it seemed likely that one of the best ways to get a line on how the bus owners were making out, financially, would be to find out how they were keeping up their payments. So we interviewed one dealer who was reported to have sold trucks on time.

He has sold eighteen trucks of one make for bus use since March, 1921, and all of them were sold on time. He said, "I have not now one dollar of overdue truck paper standing on my books." This seemed to be a remarkable condition, and we asked for an explanation. "Well, we are careful in making a time deal for buses. We size up the man who wants to buy, what kind of man he is and what his chances for success are. We insist upon his getting the necessary permits and licenses before we will sell him at all. **We turn down, probably, as many prospective sales as we make.**"

"How about the bus itself, are there any particular weak points?" we asked. The dealer replied, "The trucks we sell for bus use have a special bus engine, giving more power, and we furnish a higher gear rear axle so the bus can make speed without racing the engine. Too high engine speed simply burns up the engines. We sell another make of truck which gives satisfaction in commercial work, but we will not sell one of them for bus use even if the customer is ready to pay all cash. They will not do for bus use and we would only lose by selling them for that purpose."

Special Service for Buses Necessary

Service is one of the important problems in bus operation. All of the greasing, oiling, cleaning and minor repairs must be done, usually, at night or rather early in the morning between midnight and 5 a. m.

Bus owners report that some eight or ten garages furnish twenty-four hour service. Work is done after midnight after the bus comes off the route. This service is furnished at regular rates not at overtime rates. Some of the dealers also give twenty-four-hour, seven-days-a-week service in their shops. Many of the owners take care of their own cars, lubrication, minor repairs and adjustments, and go to garages or dealers' service station only for the larger jobs or overhauls.

This feature of twenty-four-hour service is vitally important to the bus owner, and must be provided in some way by any dealer actively campaigning for bus sales.

Personal Element in Success

"Success with buses depends upon the individual. Just like in other lines of business some will make a go of it and others will fail." We quote again Mr. Dukes of the Camden County Bus Assn.

A typical illustration. One man bought a bus, a one-ton truck with a bus body. He ran it one-shift himself and hired a driver for the other shift. He did a good business and made money. After about

The Storm Did Not Stall the BUSES

During the trying hours of the recent snow storm, the Buses showed their superiority over the Trolley.

To have the Buses excluded from the Ferry Plaza would work untold hardships on the traveling public.

Ask anyone who tried to get home Saturday during the raging storm.

Our Brooklawn and Gloucester buses were the only means of transportation along Broadway, in many instances carrying stranded trolley passengers to their destinations.

Our Merchantville buses extended their trips to Maple Shade and Moorestown, giving relief to many stranded passengers in this territory.

Forty-fourth and Westfield buses took Pensauken residents through without a hitch.

Haddon Avenue buses were the only means of transportation east of Harleigh Cemetery during the storm.

RIDE BY BUS

Camden Co. Bus Association

Buses Get Through!

**Brewer's Williamstown Buses
Broke Through the Storm**

Blocked roads between Camden and Williamstown. All vehicular traffic had been halted by mountains of snow.

The Brewer line intent upon maintaining its regular schedule put 60 men to work on the highway and regular trips were resumed.

Other traffic followed.

YOURS FOR SERVICE
CAMDEN, BLACKWOOD AND WILLIAMSTOWN BUS

H. L. BREWER

3622 Westfield Avenue, Camden

**These Newspaper Advertisements Show
How Favorable Publicity is Circulated by Camden Bus Operators**

a year he traded the bus in for a larger one, arranging to pay the balance on time. During the next two or three months he took in more money than ever before. His new truck required no repairs just then, and with income up and expenses down he thought he was getting rich. So he stopped driving the bus himself, hired another driver, and "took things easy." Within a few months he was in financial troubles, repair bills and time off for repairs cut down his income and he

finally lost the bus because he did not keep up the payments.

Buses Triumph in Snowstorm

On Saturday, January 28th, one of the worst storms in years raged in the Middle Atlantic States. A heavy fall of snow and very high winds resulted in drifts that tied up transportation in a large area.

Camden and its vicinity received its full share of the storm. About a foot of snow and high winds tested all forms of transportation to the utmost.

And the way the buses stuck it out and kept up service was remarkable. The bus owners realized that the storm was a challenge, a battle, the hour of trial had come. Could the buses make good?

Saturday night and Sunday gave the answer. **They did.** These two words state a fact.

A railroad branch line abandoned service because of a twelve-foot drift; all trains were late. Trolleys were delayed, stalled and many runs were given up altogether. The buses were late on trips, but they fought their way through. The drivers showed both determination and skill and they needed both. One told of getting around a drift by driving over the sidewalk; another got around a drift by going through an open lot.

The efforts of the busmen made news. On Monday the local papers in front-page articles told of the damage done by the storm and the tie-up of transportation except the buses.

L. S. Brewer, one of the bus owners, operates four buses on a route from Kaighn Ave., Ferry to Williamstown. They run on a fixed schedule and time tables are distributed to customers to advertise the service.

During the storm of January 28th, all trips were made except the midnight one. On Sunday, drifts almost as high as the buses made travel impossible. It was a time when any owner would have been justified in quitting. But Mr. Brewer hired sixty men and put them to work on the roads. And service was resumed.

On Monday afternoon the thawing snow delayed his buses. I rode with him in his touring car to Kaighn Ave. Ferry, where he met one of his drivers. He learned from him the conditions of the roads and how the buses were keeping up to schedule. He picked up a few waiting passengers and started off on one trip in the touring car and left the bus in Camden ready to start the next trip right on time. This trip cut short my interview with Mr. Brewer, but I learned from others that his line to Williamstown did not pay when first started. But he kept right at it and built up the trade. He got a lot of regular riders by making a special or commutation rate for them. The patronage gradually increased and four buses are now used on this route. Its present standing is due, in no small measure, to the executive ability and determination of its proprietor and the use of equipment adapted to the requirements of the work.

The bus field will furnish an outlet for the sale of many trucks. But the requirements, peculiar to bus work, for success met be known and understood alike by owner, dealer and manufacturer.

Who Will Handle the Big Deals in Bus Sales?

Will the Manufacturer Try to Override the Dealer, or Will the Dealer Receive Ample Compensation for His Labors?

This is a Subject for Every Manufacturer to Consider

By C. S. PERRIE

IT is admitted by those versed in the economics of transportation that the gasoline propelled vehicle has made great inroads in the fields of the common carriers, the steam and electric roads, and that with better highways there will be a vast increasing use of the motor vehicle in these fields. And it is not improbable that the day will come when it will be possible to complete a tour of the country by motor bus; that one may step into a bus at Boston, and by virtue of interlocking or connecting lines, motor to San Francisco or some other far distant point. Trolley tours have been established, so why not the motor bus tour? The rapidity with which such transportation will develop will be measured in terms of good roads plus the development of the bus industry, and in the latter respect the distributor and dealer will play an important role.

Some Will Succeed Others

This bus wave, which is engulfing the industry, judging from what we hear in the trade, will land some dealers high and dry on the banks of retired business men. Some will float with the tide and achieve fair success. Others will sink to the bottom. Among the latter class will be the dealer who believes selling buses can be accomplished as was the sale of trucks during the boom times. And the salesmen who share this belief will also fail, for selling buses is going to develop that type of salesman the industry likes to talk about, the ideal type, the **merchandiser of transportation**.

Not so long ago the writer sat-in with a group of men who are long in experience in the industry. This group included a truck manufacturer, sales manager of another factory, a distributor and a big dealer, and there was much shop talk. Eventually the subject of buses and bus sales was introduced by the dealer asking the manufacturer what he thought of the possibilities. In a few words the opinion was that the big business would be with steam and trolley companies who would be forced to use buses, because of economical reasons, on local lines and short runs where the steam train or trolley could not meet expenses if ade-

quate service was given. The speaker stated that a number of trolley companies were either operating buses direct or controlling bus operations. He contended that with the development of the ultimate, economical design of bus that much trackage would be replaced by the motor bus. Also that as new suburbs were developed that the bus would serve these either as a part of the trolley or steam lines or as a subsidiary concern.

Skimmed Milk for Dealers?

"But who will sell these companies?" asked the dealer.

"Either the factory direct or through a factory branch with men trained for analyzing the field or, in other words, transportation engineers who know transportation from every angle," was the reply.

"Well," exclaimed the dealer, "that's all very fine for you but what about us dealers? Where do we come in?"

"You will come in, as you put it," said the manufacturer, "if you can sell transportation, but it is going to take a big man to sell a railroad or a trolley company a fleet of trucks, and I believe that it is too big a job for a dealer or even a distributor," and the speaker smiled at the distributor, who, by the way, sold the speaker's product.

"Mr. — may be right," remarked the sales manager, "but out at our factory we take a somewhat different slant. We have been analyzing this bus subject for some time and have approached it from the dealer standpoint, for we believe that while we will dispose of a large number of buses in 1922, and more in 1923, we realize that we must depend upon the dealer organization to sell the bulk of our product which will be our standard types. I think Mr. —, that you will agree with me that the bulk of future sales will be in the smaller places, not the big cities, and that we must build confidence and loyalty in our dealer organization, not inspire a feeling of, well, let us say, that 'you are good enough, Mr. Dealer, to sell small stuff, but when it comes to a real big order, we want all the profit.' Our concern does not believe that the so-called national business meth-

ods encourage the dealer to spend the time and money, hire real brains to sell big business, on the other hand virtually telling the dealer that he can only have the crumbs, a mere few dollars when he indirectly or directly put over the big sale breaks down his morale. We all talk about the good dealer, but are we really giving him encouragement? You will pardon my frankness, but I do not agree with you that the dealer should be frozen out of this big business you mention."

"Well," replied the manufacturer, "I suppose you would prefer to let the dealer try and sell while your competitor grabs off the contract with real salesmen. Our concern builds trucks to sell them."

Some Pointed Remarks

At this point the discussion took on a personal bent, the dealer starting the ball rolling by remarking that he knew darned well that the speaker made trucks to sell. "Had some experience with your house in my territory. It may be selling when you will allow \$1,500 for \$200 worth of scrap, but it's darned rotten competition, I'll tell the world! Perhaps if we bought as low as you do we could cut the legs off all our competitors."

For a few moments some pithy remarks were exchanged regarding factory methods, sales, trade-ins and dealers, and, fearing that personalities might be further indulged in, the sales manager diplomatically led the dealer away, and when the latter cooled down outlined what he (the sales manager) deemed the dealer's opportunities in the bus field.

"To sum it up in a few words we have found that the motor bus field is diversified, that is to say that it will range from the big sales to railroad and trolley companies to the small bus that may be used to transport children from their homes to the school and back. Under the head of big business, and in addition to the common carriers, will be municipal business, cities where the municipal authorities will operate city owned buses.

"The next in line is the interurban, which is buses linking up small places with a city or connecting links between small places and small cities and particularly where new territory is or has

been developed. Take, for example, where real estate companies develop a section some distance from the small city and where a trolley company cannot afford to build an extension to this section. These places afford an excellent opportunity for one or more buses, for they can develop business all along the line. Then there is contract work, where children have to be picked up over a route and carried to school and brought home.

Dealer Has the Contract

"We believe that outside of the big sales, and I will discuss that angle later, that the dealer is well qualified to analyze the territory, to know the area to be served, roads, grades, seasons, traffic, how the public is now served, mileage, number of paying and non-paying trips, schedules, etc. Being on the ground, he will know the feeling of the public as to the present methods, how same could be improved with buses and under what conditions a line would have to operate; that is, what laws or ordinances are in effect and those contemplated. The local dealer, through his business connections, ought to know how a franchise can be secured and what it means to the investor in trucks. In other words, we believe that if we encouraged the tabulation of all of this information, even in a general way, that the live-wire dealer will be able to get out and gather the information a prospect will require. We propose to co-ordinate this information. In other words, if you were the dealer in this State, and sold a man a few buses and he planned to extend his line into a town in the adjoining State, it would be essential for you to know what your customer must do to comply with the laws of that State and what he must do to secure permission to operate.

Analyzing Costs and Territory

"Then there is the forming of companies to operate a line. It might be that the situation would develop that would require a corporation with money or that the forming of one could be effected. Now the dealer should know something about how to proceed, how to gather facts to present in concrete form to represent-

tatives of this company. It would probably require that the dealer go over the territory and make a survey, noting the mileage, number of trips practical, population and if it were possible to develop an express or general haulage business in conjunction with the passenger service, for in some sections we believe that standard trucks can be used in this respect. And there are cost figures, those dealing with investment, depreciation, insurance, repairs, replacements, garaging, etc. These are being carefully analyzed, so as to make it as practical as possible for the dealer to use them. And the service angle is being given consideration, for we realize that the service for the bus must be 100 per cent. We are also working on a plan to show the dealer how he can advise bus owners to overcome the obstacles of snow and cold weather. Equipment is another consideration, as well the employe angle."

"That's fine," remarked the dealer who had made notes during the discourse. "That's what I call real co-operation and it is a darned sight more than my factory is doing for me. I judge that you believe that we dealers can go out and sell transportation, as that bird called it, after all. What?"

"Yes," said the sales manager, "some dealers can and will, but lots won't, I fear. It means a study of conditions, of

keeping your eyes and ears wide open. But it can be done, for it simply means analytical work, compiling facts and figures."

"But how about that big business stuff," asked the dealer. "Will your concern gyp its dealers as that fellow remarked? What is your policy, may I inquire?"

Always Room for One More

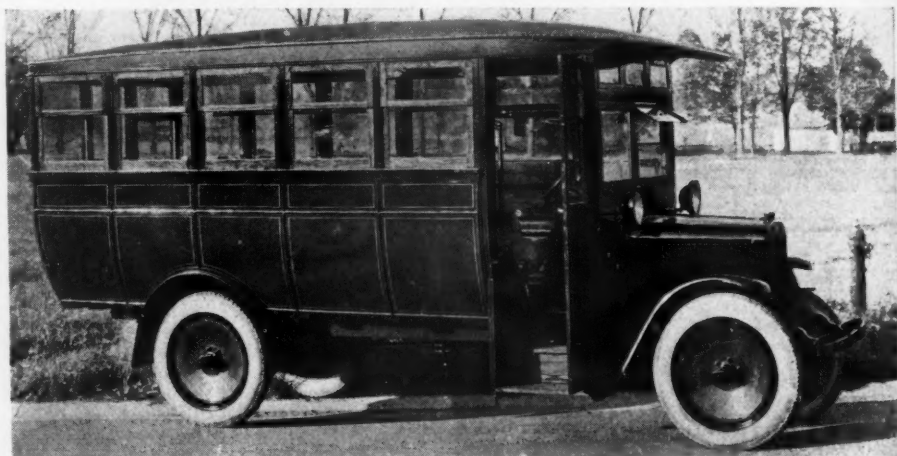
"Well," replied the S. M., and he smiled, "we are going to give any dealer of ours who works directly or indirectly on the big stuff a real compensation, and if we think it is really a big deal we will shoot some men down to help put over the business, but the dealer gets his, as he should. Now you may think it queer that I have told you all this, but it is not a secret, but a policy for 1922, for we still have room for more good dealers."

"I guess I'll get aboard your band wagon, if you will have me," said the dealer. "My contract is up with the Blank Company and I don't care to renew it. Their new contract has too many jokers."

"Seen our new contract?" asked the S. M.

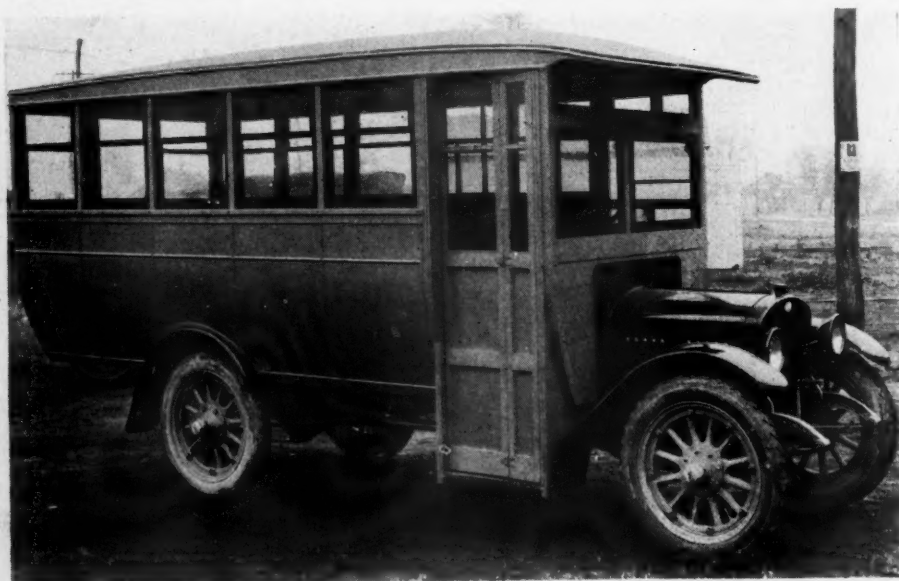
"Sure I have, and it's a real honest-to-goodness one."

"Sign right here," said the S. M., passing out a pen and indicating the dotted line. The dealer signed.



Conventional Eighteen-Passenger Bus Mounted on a Model 15, One-Ton Red Pyramid Speed Truck

Body is fitted with windows to raise, pay-as-you-enter entrance opposite the driver, emergency rear door, rattan-covered seats with spring bottoms and backs, and ample space between seats to allow adequate knee room. Five passengers may be seated across the rear end, and six passengers on the left-hand side face forward, while the other six face inward. Light is provided by electric dome lights and a fully upholstered bucket-type seat is provided for the driver. It is built by the Service Motor Truck Co., Wabash, Ind.



Appearance and Durability in Construction Are Two of the Characteristics of This Bus Job, Built by the Bus Body Corporation, Evansville, Ind. This Particular Body is Provided With Side Cane Seats and Mounted on a GMC Chassis

Why Motor Buses Are Making Good in Columbus, Ohio

AMONG the urban bus lines showing a constantly increasing business and with bright prospects for considerable extension of its lines within the near future is the system maintained by the Ohio Motor Bus Company, in Columbus, Ohio. This company operates modern, well-equipped motor buses through the very best residence district of Columbus into the business center of the city, and an interurban line from Columbus through Linden, Maple Heights, Clintonville to Westerville. So well has the system paid to date that it is planned, in the near future, to form a larger corporation and to extend the bus service not only within the city, but to other surrounding towns.

Reference to the map shown herewith gives a very good idea of why the Columbus lines have been successful. Only that part of the city served by the bus lines is shown, this section comprising the main business district centering on the State House (1), and extending east through the high-class suburb, Bexley.

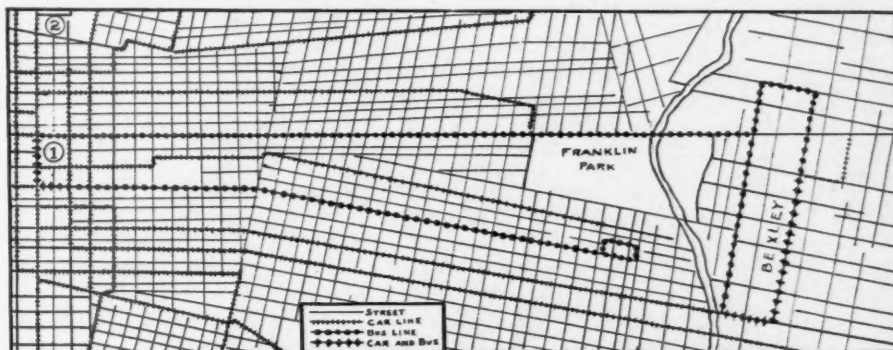
The routes chosen fit admirably into the present street car system, as the map shows, and follow, with the exception of a very few blocks, streets of the boulevard type, on which there are no car tracks.

Columbus' street car system has not made extensions, and but few improvements, in many years, and the cars in use are mostly of an old type. The tracks, in many places, are in bad shape, and the schedule slow.

For this reason residents of the sections now served by the motor buses welcomed their coming gleefully. They sprang into instant popularity, and because the management had the good sense to hire only courteous and careful drivers, their popularity has grown daily. Today the buses are carrying considerably over

5,000 passengers daily, and giving Columbus transportation service that it has never had before.

Reference to the map shows the route traveled by the buses. The buses operate over the entire route, making the loop at each end and returning again through the business district. The larger loop, shown in the suburb Bexley, serves the residents of that district in a way that has brought the company much commendation.



Where the Bus Lines Operate in Columbus, Ohio

Columbus has never had any cross-town street car lines outside of the business district, and the bus company will, in the near future, operate a bus across the eastern section of the city that will cut all car lines and bus routes, giving a service that has long been desired by residents of that section. Today, without this service, residents who want to go north and south through this district, have to make the trip down town and then out again to the point they wish to reach.

The company is using large motor buses built by the American Motor Bus Company, of Newark, O., the Ace truck chassis being used. Most of the buses are equipped with 40 x 8 Goodyear pneu-

matic tires, which are giving cheaper service, according to the management, than solids. They state that solids can not be worn out on bus work profitably, as they have to be discarded just as soon as they begin to develop bad spots, which make riding unpleasant to passengers.

The bus bodies are of the street car type, 81 inches wide over all, with seats transversely, and center aisle. They seat 28 passengers. A smoking compartment is provided in the rear of each bus.

The personnel of the company consists of two executives, two garage men, fourteen drivers and two dispatchers. The drivers are paid \$25 per week. As with all other successful bus lines, it has been found necessary to keep the overhead charges down to a minimum.

The buses start both ways down town at 6 a. m., and run every 12 minutes until midnight, when the last bus leaves the down town section. Each bus makes 22 round trips per day, the city route covering seven miles. The fare is five cents, within the city, and ten cents to and from Bexley.

At present the buses pay no city license, an attempt to saddle them with \$500 annual license for each bus having recently failed.

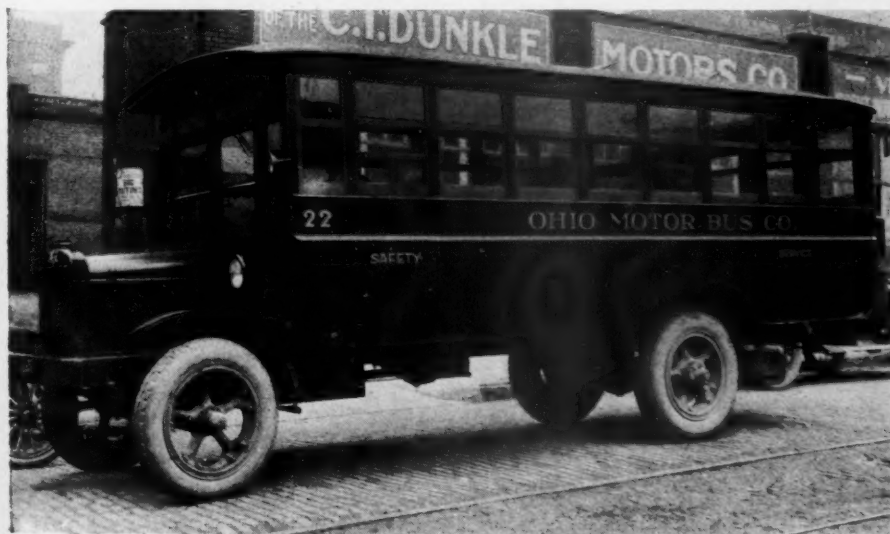
They operate under the control of the Public Utilities Commission of Ohio, but to date there has been no regulatory legislation passed by the Columbus council covering bus operation.

A source of income not to be overlooked by bus owners is the advertising space inside the buses, the Columbus company receiving \$750 per bus from this source.

Over a three months period figures kept by the company show that the buses averaged 18 passengers per trip.

Each bus uses on an average of 30 gallons of gasoline and 1½ gallons of lubricating oil per day.

I. C. Robinson is president of the corporation, and R. E. McCollum is vice-president and general manager. The office of the company is at 562 East Mound street, Columbus.



This Bus Seats 28 Passengers. Smoking Compartment in the Rear

There is Urgent Need for Cost Figures in Bus Operation

Outside of a Few Well-Established Lines, There Are Few Figures Available Showing Actual Cost of Operation. Small Bus Lines Seem to Ignore Necessity of Taking Care of Costs. Generalities of No Use. Figures Must be More Specific

By C. P. SHATTUCK

THE motor truck industry is highly interested in the possibilities of motor buses, and because of the exceptional sales possibilities it follows that the dealer is also greatly concerned in this field. According to the Commercial Survey Department of the CHILTON COMPANY, there were 23,451 motor truck dealers in the business during the month of September. A certain percentage of these dealers will cash in on the new field but more would profit if they were grounded in what motor bus transportation really is, what its possibilities are and how the basic facts essential to sales can be obtained.

Transportation Fundamental Principle

Volume of sales will not be obtained in this new field of endeavor until the truck manufacturer sells motor bus transportation to the dealer, the dealer sells it to the prospect, and the prospect (when organized) sells it to the public. In other words, any manufacturer, distributor or dealer who hopes to achieve success in the motor bus market must sell transportation and the right kind of transportation. **The motor truck manufacturer, dealer and operator of the bus must build, sell and operate on a sound economic basis and the SERVICE RENDERED THE PUBLIC MUST BE 100 PER CENT RELIABLE AND DEPENDABLE.**

The motor bus is not new. It has been with us for some time but unfortunately its development is being retarded because of two factors. First, the tendency of some dealers to exploit the standard truck chassis with a bus body on it to that class of operator known as the jitney. In too many instances the so-called buses are sold on nothing down and a trifle less per month, to a class of operators who "gyp" the trolley cars. The word "gyp" is used because the efforts of this class is centered entirely upon direct competition, i. e., in cities where fairly efficient service was being rendered by the trolley companies. This class referred to is antagonistic to the railroads and the electric traction companies, competing with them on short hauls and principally during the rush hours. During the early morning hours, late at night, and when weather conditions are adverse, these jitney operators are noted for their absence. What

success these bus operators achieve is only temporary, and eventually the dealer, or the finance companies, have worn and abused trucks on their hands.

The second factor, which is analogous with the first, is that the jitney or bus is so frequently operated in direct competition with the common carriers and not as an ally, as it should be. The need of correlating the motor vehicle and good roads with the common carriers is necessary, so that the problems of the latter may be solved.

High Costs Mean Retrenchments

It is common knowledge that the railroads and trolley companies serving the smaller communities are struggling for existence. The continual cutting of local train schedules, and interurban trolley service, may be partly due to the passenger car, truck and motor bus, but the railroad authorities explain the retrenchment in service to high material and equipment costs, labor, etc. All of which brings us to the crux of this article, and which is the cost of transportation by the motor bus as compared with that of the common carrier.

Costs cannot be ignored in transportation whether it be the one man bus line or a fleet such as operated by the Fifth Avenue Coach Co. It would appear that the simple formula of cost, plus overhead, plus profit, is applicable in the case of the bus if intelligence is employed and the **COST DATA COMPILED RELATIVE TO THE CONDITIONS UNDER WHICH THE BUS MUST OPERATE.**

Real, Not Imaginary, Costs Necessary

Many cost figures, which are questionable, are being used for propaganda work these days. These figures are usually so compiled that the reader would logically assume that with a small initial investment, plus work, he could soon pay off the balance and earn an annual sum of very attractive proportions. These figures may be general. They may be fairly indicative of some section, but unfortunately they will eventually defeat the purposes of those who employ them to stimulate interest in the possibilities of the bus, or to attract buyers.

Unless cost figures are carefully prepared, based on real operating conditions

over a period of many months, including every item that can be and should be charged up, they are likely to react as does the boomerang. The cost figures of the ordinary truck, irrespective of capacity, cannot be applied to the bus **because of the difference in the character of the work.** And yet cost figures, those dealing with general conditions, are being utilized.

Must Keep Cost Records

Eliminating the jitney type, there are thousands of bus lines in operation in this country from which fairly accurate cost figures could be obtained—**IF, the owners or operators were sold on the value of keeping cost figures and were shown how to keep accurate cost figures.** In a certain county in New York State there are a number of bus lines which connect the small towns and suburbs with the cities. They appear to be well patronized and render good service. Some are supplying a need created by discontinuance of service by the trolley companies. Others have opened new routes. Yet none of those interviewed by the writer keep any real cost figures. They say they are making money, but as they have not been operating long enough for repairs, replacements, etc., to use up some of their profits, it is doubtful if these operators actually know whether their tariff is too small or too big. Eventually, one or more of these operators will find his actual or net returns dwindling, and in time he will go out of business, thereby supplying excellent ammunition for the anti-busite, of which type there are still a few left.

In one place in the county referred to, the trolley company has been in the hands of a receiver for some time. The equipment is in bad condition. The service, of course, is not as good as in the old days when the nickel rate prevailed. In some manner or other a rumor developed that buses would **replace** the trolleys. The newspapers took it up. Citizens wrote letters. Soon the city was divided into two factions. One for the bus, because it meant a 5 cent fare. The other side was for the trolleys, arguing that poor as the service was it was dependable, while the bus was an unknown factor, that they came and went as did the seasons. The bus faction lost out and the trolley is still

functioning. The moral is that those operators who did not give service did not remain in business. They were not to blame but the company that sold them.

If the motor bus is to grow in the numbers the industry expects they must be sold properly from the factory down, as previously stated. It is not an order taking proposition for the manufacturer, distributor or dealer, although some buses will be sold because the prospect is glib and is influenced by glittering generalities. Accurate, comprehensive cost figures must be forthcoming and be specific enough to deal with the short

run line of one or two buses of a fleet. These figures must be carefully compiled and as carefully employed, and the dealer and his salesmen must use them intelligently, not as too many cost figures have been used in the past.

And there will be need of some cost accounting system, a simple one for the operator of two or three buses and a more elaborate system for the company having a fleet. The factory and dealer must coordinate their efforts in educating the purchaser to keep accurate cost figures, under varying conditions, and when so kept the data, if honestly employed, will

attract that capital needed to develop the bus field. It is reasonable to assume that investors will desire other than general figures. And if figures are not to be had how can capital be sold? Predictions are two-edged tools, but the writer hazards one and that is, that the real big sales, bulk, will be to individuals or companies having sufficient capital to purchase, operate and maintain buses until, at least, they iron out the wrinkles and determine what are the real problems in the newer means of transportation. Cost figures cannot be ignored where transportation dealing with the public is concerned.

Railroad and Highway Transportation vs. the Public; or Who Really Maintains the Railroads and the Highways?

By F. R. FAGEOL

MUCH has been said and written about the relative costs of transportation—either passenger or freight—over railroads as against automobiles or motor trucks. As automobile and motor manufacturers, we wish to admit that we do not consider automobiles or motor trucks will ever transport either passengers or freight as cheaply as do the street railway companies and the railroads. But we do not believe the question of cost really enters into or is a part of the consideration.

The great consideration is **convenience**.

The progress of the world, to date, has been marked not necessarily or primarily by reduction in first costs, but rather by ways and means that create greater convenience; greater convenience, on the whole, tending toward higher standards of living, more industry, and more prosperity for everyone concerned.

By way of a few simple illustrations: No man ever rode from his home to his office in his automobile cheaper than he could have ridden on a street-car. But the cost was not a consideration; it was **convenience**. It would be cheaper to heat your water in a teakettle, pour it in the washtub and take a bath in that manner (as they did in the olden days) than it is to spend a lot of money equipping a house with plumbing, bathtubs, etc. But no one seriously consider doing this, because the bathtub is more **convenient**. And so on, one could go with numerous examples, indefinitely.

Show me a land inhabited by a people who do not know or do not care about convenience and where everything is extremely cheap, and I will show you a non-progressive, backward people.

I herewith quote the results of some very interesting figures (compiled recently by E. V. Buckwalter) covering traffic conditions on highways, versus railroads between Pittsburgh and Bedford, Pa. Condensed, these figures show that there

were 6000 people per hour being transported by motor transportation over the highway as against 4400 people per 24 hours via railroad. Considering the railroads were only operating 12 hours—which time covers the dense travel on the highway—they would be transporting approximately 360 people per hour. In other words, on account of **convenience**, wherein cost is of no consideration, there are as many people being transported by motor-driven equipment over our highways every 3½ minutes as there are over the railroads every hour! And, it is our opinion that the great tonnage of freight will, in time, be transported in about the same proportion.

The railroad companies have, during recent years, indulged in a great deal of talk that they were being discriminated against by motor truck operators and treated very badly in general, on the following grounds:

The railroad companies maintained that they keep up their own railroad tracks and right-of-ways, and that the general public keeps up the highways over which motor truck and motor bus transportation travel. It is the writer's contention that these claims are based largely on false reasoning, in that the general public—the consuming public, you, I, and everyone else—maintain and keep up all railroads and all highways, and all of everything commercial that exists, and if the railroads do not derive their revenue for keeping up their right-of-ways, etc., from the general public—just **where** do they get it? They must have found an ever-flowing fountain of gold and have guarded their secret well.

The public really maintains the railroad right-of-ways and all of their equipment by a direct tax in the form of freight on every article they purchase. Whereas, they partially maintain our great highway system by a direct tax on all articles transported over them and through the

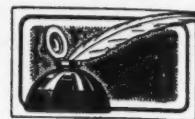
indirect tax which they pay on property, motor licenses, and otherwise.

The great point is that the consuming public must pay for everything; it can come from no other source, and should come from no other source. As to just **how** or through what manner they pay, it matters little. However, if we are going to work on the theory of letting the man who can afford it pay **most**, then they certainly come nearer doing it in the maintenance of the highways than they do when paying for the maintenance of the railroads; as the highways, at least, are largely kept up by the tax on property owners and those who use them most, whereas railroads are kept up by direct tax in the form of freight on everything you consume, handle, or wear that has been transported over a railroad.

Please do not assume from the above remarks that we have any quarrel with the railroads; far from it. We greatly admire them, feel that they have in the past and always will fill a great need, and feel that the ever increasing use of motor trucks, passenger cars, etc., will probably mean that in future we will have to pay more direct tax on articles which railroads haul than we have heretofore, as an ever-increasing volume of their business is gradually going to travel over the highways instead of over the railroads, and the quicker the railroad and street-car companies recognize this true situation and recognize the demand of the public for more convenient service without regard to cost (within reason), and the railroad companies start in and provide that service, you will see railroad stock and railroad revenues go to the level where they justly belong; as surely 9,000,000 automobiles and motor trucks built and in operation in the last twenty years should be proof enough that the public demands this type of transportation, and what the public demands it always gets.



EDITORIALS



A Few Words About the March Number

THE next number of the CCJ will be devoted to that sized vehicle which is outside of the Speed Truck class. This includes all truck models greater than one-and-a-half-ton capacity. The March issue will be of particular interest in that it will show the dealer the kind of work that is being done by what might be termed heavy duty trucks. Heavy duty service does not necessarily imply work performed only by the five to seven-and-a-half-ton vehicles, but all trucks of such capacities where the speed is not the paramount consideration.

We shall endeavor to show the dealer the great variety of work which the motor trucks are now performing, giving particular attention to the unusual type of service rather than that with which the dealer is familiar. The dealer has in many instances given so much of his attention to the sale of the light capacity truck that he has overlooked the sales possibilities in the various industries which need the heavier vehicle.

The Farmer Market Must Not be Neglected

EVER since the farmer had his setback about eighteen months ago, or since the price of wheat, oats and corn took a decided drop, the impression has been gained by many truck dealers that the farmer might as well be crossed off the prospect list for some time to come. But the truth of the matter is that the farmer will soon be ready to purchase motor trucks again. Statements, made by some of the country's biggest farmers, during the recent session of the National Agricultural Conference at Washington, indicate that the farmer is soon to be in the market again for trucks.

The general impression gained from this convention was that the farmer is not as bad off as he is pictured. He has had his troubles to be sure, but the farmer is not the kind of an individual who gives up the ghost easily. He may be the loser one year, but he will make up more than the loss the following year. And regardless of the loss he may suffer, he will endeavor to raise a greater crop each year. Furthermore the modern farmer knows that

he can only meet competition these days with power machinery. He knows that if his neighbor has a truck he must sooner or later get one, or otherwise his neighbor will get the best of the argument.

The farmer will again be in the market for trucks during the summer and fall months. And, like most individuals, he is going to look for the biggest value he can get for his money. The dealer who does some constructive missionary work in the meantime will surely reap the benefit of his labors.

It Doesn't Apply to Shows Alone

THE criticism which S. A. Miles, the veteran manager of the New York and Chicago Shows, made regarding the selling methods which accompanied the New York passenger car show, should prove a valuable lesson for every dealer. It is not alone at the show, but right at home in the dealer's salesroom and by his salesmen in the prospect's office that the price angle is more often than not, made the main issue of selling point of the vehicle in question.

We approach this subject with a full knowledge of the fact that the price of the motor truck is of more concern to a business man than the price of a limousine would be to the same individual. But sight must not be lost of the fact the first cost of the vehicle is usually the least in comparison to the maintenance cost. It is the after cost which should be brought to the attention of the purchaser, especially if he has not had any previous experience with trucks. If he is already an owner of trucks he knows that he cannot expect the same length of service from the cheaply constructed machine that he does expect from higher grade, quality-built machine.

The price of a truck seems to be given more consideration than the other qualities which make the vehicle a necessary adjunct to the manufacturer or merchant having use for a truck. How that merchant is going to use the truck; what kind of loading facilities he is going to employ in connection with it; the service which is to be rendered after the machine is placed into use; ways and means of using the truck so that it will be a money saver, etc., are subjects which should be so thoroughly discussed with the purchaser, that the price will be an after consideration.

News of the Trade in Brief

Personal, Factory and Dealer Notes on Page 78

N. A. D. A. Elects Officers

Tom Hay, Chandler and Cleveland passenger car distributor in the Chicago territory, was unanimously chosen president of the National Automobile Dealers' Association at its annual meeting in Chicago during the show. W. L. Hughson, of San Francisco, Ford distributor in California, was re-elected to the vice-presidency, with John A. Butler, Dodge distributor at Kansas City, second vice-president. F. W. A. Vesper, of St. Louis, Buick distributor, was re-elected treasurer. New directors were chosen as follows:

R. H. Martin, Atlanta, Durant car and GMC truck; George O. Wildhack, Reo, Indianapolis; P. H. Greer, Los Angeles, Hupmobile; G. G. G. Peckham, Cleveland, Buick car and GMC truck; Ginder Abbott, New Orleans, Packard, Franklin, Chalmers, Maxwell, and A. S. Eldredge, Seattle, Buick distributor.

Harry G. Moock was retained as manager.

An entirely new plan of membership

was adopted at the Chicago meeting, doing away entirely with the former ten-dollar-a-year memberships previously in force. Under the new plan members must measure up to a very high business standard, dues being graduated from \$50 to \$250 per year, according to a gross sales volume classification.

The service of the N. A. D. A. will be distributed, through local and state secretaries of trade and dealer associations, through the payment of these associations to the national organization of \$1 per year for each member. This will make it possible for the N. A. D. A. to do more for the trade at large than it has ever done before, as it will be far better financed if present plans are successful.

G. M. C. to Build Special Bus

The General Motors Truck Co. will enter the motor bus field with a specially designed motor bus. Announcement of this new model has just been made by the factory at Pontiac and the details of the bus will be published in an early issue.

Good Roads Show

The motor truck played a large part in the thirteenth national good roads show held at the Coliseum in Chicago, January 16-20. Not only were there many exhibits of special road building motor trucks, with all the auxiliaries that go to make the truck a road building asset today, but there was shown much heavy machinery that speeds up road work and lessens its cost that could not possibly be used were it not for the assistance the motor truck gives it, in accomplishing its work.

Today's road building machinery has made it possible to speed up construction programs far beyond anything known in road building of other days, and the road building outfit of machinery, men, trucks and housing camps takes one back to the days when similar outfits meant railroad building out across the prairies.

The tremendous influence of the gasoline engine on modern road building impressed one on all sides. There were giant motor-driven tractors for road

SHOWS

February 15 to 20, 1922—Cincinnati, O. Annual Automobile Show of the Cincinnati Automobile Dealers' Assn., at the Music Hall.

February 18 to 25, 1922—Akron, O. Eighth Annual Show at Central Garage (40,000 sq. ft.), under direction of Automobile Exhibition Co. Enoch T. Jones, Mgr.

February 18 to 25, 1922—Albany, N. Y. 13th Annual Show, auspices Albany Automobile Dealers' Assn., at State Armory. Passenger Cars, Trucks and Accessories. J. B. Wood, Sec., 28 Howard St.

February 18 to 28, 1922—San Bernardino, Cal. Automobile Exhibit at the 12th Annual Orange Show, in tents (32,000 sq. ft.) Passenger Cars, Trucks, Tractors and Accessories. Royal H. Mack, Mgr., Chamber of Commerce.

February 20 to 25, 1922—Duluth, Minn. Seventh Annual Show of Duluth Auto Show Assn., Duluth Armory Bldg. (70,000 sq. ft.) Passenger Cars, Trucks, Tractors and Accessories.

February 20 to 25, 1922—Deadwood, S. Dak. Tenth Annual Black Hills Auto Show of the Deadwood Business Club, Auditorium. Passenger Cars, Trucks, Tractors and Accessories.

February 20 to 25, 1922—Salt Lake City, Utah. Automobile Show at Bonneville Pavilion (24,000 sq. ft.), auspices of Intermountain Automotive Trades Assn. Passenger Cars, Trucks and Accessories. W. D. Rishel, Mgr., Newhouse Hotel.

February 22 to 25, 1922—Trenton, N. J. Seventh Annual Show, Trenton Automobile Trade Assn., Trenton Armory. Passenger Cars, Trucks and Accessories. Frederick Petry, Jr., Mgr., W. State and Willow Sts.

February 27 to March 2, 1922—Bethlehem, Pa. Seventh Annual Truck Show of Bethlehem Auto Trade Assn., Coliseum. Trucks, Tractors and Accessories. J. L. Elliott, Mgr., 1308 Norway Pl.

February 27 to March 4, 1922—Portland, Me. Automobile Show, auspices of Portland Automobile Dealers' Assn., Portland Exposition Bldg. Passenger Cars, Trucks, Tractors and Accessories. Howard B. Chandler, Mgr., 3 Park Ave.

February 27 to March 4, 1922—Amsterdam, N. Y. Third Annual Show, auspices of Co. H, at State Armory. James J. Callahan, Mgr., Box 1186, Pittsfield, Mass.

February 28 to March 4, 1922—Wichita, Kan. Third Annual Show of the Wichita Motor Trade Assn., at Wichita Exposition Bldg. (100,000 sq. ft.). Passenger Cars, Trucks and Accessories. Guy H. Johnson, Secy., P. O. Box 372.

March 2 to 4, 1922—Ottawa, Ill. Third Annual Show. Auspices of Chamber of Com-

Coming Events

merce, Armory. Passenger Cars, Trucks, Tractors and Accessories. L. C. Carrell, Mgr., Chamber of Commerce.

March 6 to 11, 1922—Indianapolis, Ind. 24th Semi-Annual Show of the Indianapolis Auto Trade Assn., Auto Show Building (85,000 sq. ft.). Passenger Cars, Trucks and Accessories. John B. Orman, Mgr., 338 N. Delaware St.

March 6 to 11, 1922—Nashville, Tenn. Automobile Show of the Nashville Automobile Trade Assn., Hippodrome or Page Garage. Passenger Cars, Trucks and Accessories. Allen F. Parkes, Chairman, Packard Nashville Motor Co.

March 6 to 11, 1922—St. Joseph, Mo. 8th Annual Show of St. Joseph Automobile Show Assn., Auditorium (90,000 sq. ft.). Passenger Cars, Trucks, Tractors and Accessories. R. S. Trachsel, Secy., 305 S. 8th St.

March 6 to 11, 1922—Yonkers, N. Y. Annual Show. Auspices of Co. B, at the State Armory. J. J. Callahan, Mgr., Pittsfield, Mass.

March 11 to 18, 1922—Fort Worth, Texas. Auto Exhibit at Southwestern Exposition and Fat Stock Show, at Coliseum. Passenger Cars, Trucks, Tractors and Accessories. M. Sansom, Jr., Sec.-Mgr., Stock Yards Station, Fort Worth, Tex.

March 11 to 18, 1922—Newark, N. J. 14th Annual Show at the First Regt. Armory (60,000 sq. ft.). Passenger Cars, Trucks, Tractors and Accessories. Clyde E. Holgate, Mgr., 343 High St.

March 11 to 18, 1922—Boston, Mass. Twentieth Annual Automobile Show of the Boston Automobile Dealers' Assn., Inc., & Boston Commercial Motor Vehicle Assn., Inc., Mechanics Bldg. (125,000 sq. ft.). Passenger Cars, Trucks, Tractors and Accessories. Chester I. Campbell, Mgr., 5 Park Sq.

March 11 to 18, 1922—Bronx, N. Y. Bronx County Automobile Show, at 105th Field Artillery Armory, 166th St. and Franklin Ave. Passenger Cars, Trucks and Accessories. H. G. Stiles, Mgr., 2483 Tiebout Ave., Bronx.

March 13 to 18, 1922—Omaha, Neb. 17th Annual Show of Omaha Auto Trade Assn., Omaha Auditorium. Passenger Cars, Trucks and Accessories. A. B. Waugh, 2051 Farnam St., Show Mgr.

March 20 to 25, 1922—White Plains, N. Y. Second Annual Show, State Armory. James J. Callahan, Mgr., P. O. Box 1186, Pittsfield, Mass.

March 22 to 26, 1922—Ann Arbor, Mich. 3d Annual Show of Washtenaw County Auto Dealers' Assn., Coliseum (20,000 sq. ft.). Passenger Cars, Trucks and Accessories. R. H. Alber, Mgr., care of Ann Arbor Garage.

March 27 to April 1, 1922—Oklahoma City, Okla. 6th Annual Show of the Oklahoma City Motor Car Dealers' Assn., at New Coliseum. Passenger Cars, Trucks and Accessories. Edgar T. Bell, Sec., 403 Oklahoman Bldg.

March 27 to April 1, 1922—Torrington, Conn. Annual Show, auspices of Co. L, State Armory. J. J. Callahan, Mgr., Pittsfield, Mass.

CONVENTIONS

Atlantic City, N. J., June 26 to July 1, 1922—25th Annual Meeting of American Society of Testing Materials at Chalfonte-Haddon Hall Hotel. J. K. Rittenhouse, Asst. Treas., 1315 Spruce St., Philadelphia, Pa.

Decatur, Ill., March 20, 1922—Third Annual Convention of Illinois Automotive Trade Assn., Executive Offices, 211 Lermann Bldg., Peoria, Ill. F. C. Zillman, Mgr.

Philadelphia, Pa., May 10 to 12, 1922—Ninth Annual Convention of the National Foreign Trade Council. O. K. Davis, Sec., 1 Hanover Sq., New York City.

Santa Barbara, Cal., October, 1922—Annual General Convention of the California Automobile Trade Assn. Robert W. Martland, Sec., Pacific Bldg., Oakland, Cal.

San Jose, Cal., February 20 to 21, 1922—Northern Division Convention of California Automobile Trade Assn. Auspices of Santa Clara County Automobile Trade Assn. Robert W. Martland, Sec., Pacific Bldg., Oakland, Cal.

Trenton, N. J., May, 1922—Annual Convention of the New Jersey Automotive Trade Assn. H. S. Moore, Sec.-Treas., Trenton.

FOREIGN EVENTS

Amsterdam, Netherlands, February and March, 1922—Automobile Exposition.

Mexico City, Mexico, April 16 to 23, 1922—First Annual Automobile Show of the American Chamber of Commerce in the National Theater (23,000 sq. ft.). Passenger Cars, Trucks, Tractors and Accessories.

Prague, Czechoslovakia, April 22 to May 1, 1922—14th International Automobile Exposition, auspices Czechoslovak Automobile Club, Prague.

Santiago, Chili, March, 1922—Annual Automobile Show.

Scheveningen, Netherlands, May 1 to 15, 1922—Automobile Exhibit. Address, No. 185 Spui., The Hague.

grading and material hauling; there were huge motor-operated cranes for loading material into trucks and trailers; there were gasoline-driven locomotives for hauling material trains along the narrow-gauge road that is today a part of all big road building projects; there were concrete mixers, hoists, pumps, scrapers, shovels—all operated by the gas engine that the automotive industry has brought into its own. The trucks—of course, the very last word in the modern road building motor truck, fitted with dump body, and ready to take its place in the vast fleet that in these days feeds the road builder his material from the rear as in the days of the great war it fed the army its war-making material from behind the lines.

During the show the nineteenth annual convention of the American Road Builders' Association was held, with a long program of constructive addresses that were listened to by many hundreds.

The motor truck manufacturers and the lines allied to the truck were well represented at the show.

Selden, Automotive Pioneer, Taken in Death

George B. Selden, chairman of the board of directors of the Selden Motor Co., of Rochester, N. Y., and one of the inventors of the first gasoline-propelled vehicles, died at his home in Rochester, January 17, 77 years of age.

Mr. Selden's name recalls the litigations with Henry Ford over the Selden basic patent, begun in 1899, which were finally won by Ford. The case dragged over many months and involved a great number of prominent figures in the automobile field.

His life was marked by unceasing devotion to the automobile industry and many are his contributions to automotive knowledge. He worked constantly for civic betterment in his home town and was known to be a man of great tenacity and perseverance.

Credit Conditions Improve in Automotive Industry

Figures made public by the Motor and Accessory Manufacturers' Association, based on the official monthly financial survey, indicate that during December credit conditions in the automotive industry show a substantial improvement, although sales showed a sharp drop.

Approximately 300 manufacturers of parts, units and equipment report that their sales to automobile passenger car and motor truck manufacturers fell almost 25 per cent from the November figure. This decrease represents the normal seasonal decline in anticipation of the January automobile shows.

The totals of notes outstanding dropped slightly more than 7 per cent during December. Inasmuch as this item showed a 5 per cent increase in the previous month, credit managers are somewhat encouraged by the gratifying improvement in underlying conditions as reflected by this accelerated adjustment of outstanding obligations.

Past due accounts also show a healthy decrease during December—a drop of 3 per cent.

The manufacturers selling accessories and units to jobbers and dealers report heavy increase in business whereas most of the transactions of the unit and part makers represent releases on old orders. The replacement business on accessories and parts is looming up as a considerable factor in the present situation. Stocks of jobbers are in many cases depleted to the minimum, and, as a result, inquiries and orders from this source are increasingly manifest.

The percentage changes for the last 11 months are:

COMPARATIVE FIGURES FOR 1921

Month	Per Cent Change*	Per Cent Change†	Per Cent Change‡
February	66.15 Inc.	17.07 Dec.	39.08 Inc.
March	93.30 Inc.	16.57 Dec.	16.38 Dec.
April	32.93 Inc.	4.49 Dec.	5.94 Inc.
May	0.13 Inc.	15.64 Dec.	16.77 Dec.
June	15.19 Dec.	4.79 Inc.	10.37 Dec.
July	1.68 Inc.	10.79 Inc.	7.90 Dec.
August	1.31 Inc.	17.06 Dec.	5.30 Dec.
September	1.09 Dec.	0.22 Inc.	5.24 Inc.
October	4.70 Dec.	3.54 Inc.	5.82 Dec.
November	13.85 Dec.	3.56 Dec.	5.73 Inc.
December	24.47 Dec.	3.02 Dec.	7.58 Dec.

*Purchases of parts, units, equipment, etc., by automobile passenger car and motor truck makers from 300 parts and accessory manufacturers by months—per cent change.

†Totals of past due accounts reported—per cent change.

‡Totals of notes outstanding—per cent change.

ONLY 1126 MOTOR TRUCKS BROUGHT BACK

That badly worn alibi that "we can't sell motor trucks because of the thousands of American trucks brought back from overseas and put on the market" won't go any more. For Gordon Lee, chief of the Automotive Bureau of the Department of Commerce and Labor, has given out the statement that just 1,126 of these trucks have been re-imported into this country.

Judging from the amount of publicity given the trucks that were brought back, there was a general impression that the figure was well up in the thousands. But the figures of the department are the true figures, so these aggregations of rust and worn out tires and shell-shocked truck cripples didn't put the crimp in the industry that some would have us believe.

Sales Managers and M. T. M. A. Associations Combine

For the purpose of bringing together in one co-ordinated body the manufacturers, sellers, dealers and users of motor trucks, the National Association Motor Truck Industries was launched at Chicago at an all-day session of those interested, January 31. In the new organization are the former members of the Motor Truck Manufacturers' Association, and of the National Association of Motor Truck Sales Managers. Both of these organizations had previously been disbanded to clear the decks for the new association.

Headquarters of the association will be at 1156-7 Book Building, Detroit, and Don Whitaker will act as general manager.

A letter ballot will be taken very shortly to elect nine directors, and immediately following, these directors will gather to elect a president, vice-presidents, secretary and treasurer.

Membership in the association is open to motor truck manufacturers, truck parts manufacturers, sales managers, distributors and dealers, and truck users. A department will be maintained for each, and for those who service motor trucks, with a vice-president in charge of each division. It is hoped by this means to bring about a co-ordination of effort in the motor truck industry that will place this business on a footing that will lead to permanent prosperity for all concerned. Previous separate organizations have functioned all right in their respective spheres, but there has been a lack of co-operation that has not been for the best interests of the industry.

Twenty of the members of the new organization are also members of the National Automobile Chamber of Commerce, and it is the wish of the association to work in the fullest harmony with the older national body, carrying out, through the new group, the best practices of the Chamber, as applied to the motor truck industry.

Dues have been placed at such a figure that the association will have ample finances to carry on its constructive work, and there is every desire on the part of the members to make this body the kind of national truck body the industry has sorely needed for a long time.

Mr. Whitaker, the manager, was for some time manager of the national sales managers' organization of the industry, and previous to that was connected with leading truck manufacturers as an executive in their general sales departments.

May Appoint Transportation Commissioner

An effort will be made in the near future to have legislation enacted empowering the President to appoint a Commissioner-General of Transportation, says a report prepared by the committee on railroads of the Chamber of Commerce of the United States. The commission is to act as a sort of court of arbitration for the development of a co-ordinated system of inter-state transportation. He will have the privilege of recommending regulations which will have as their purpose "the articulation and economical use of all transportation facilities, including tracks, highways, terminals, transfer facilities, docks and landing places."

Construction of I. H. C. Plant to Begin Soon

March 15, 1922, is the date set for starting operations on the proposed truck plant of the International Harvester Co., Fort Wayne, Ind. It is announced that the plans for the plant indicate that it will be the largest of its kind in the world. Particular care will be taken with the surroundings of the plant to make them as artistic as possible. It is expected that the plant will be producing trucks within a year's time.

New Motor Buses

Special Duplex Bus for Rail Operation

THE Duplex Truck Co., Lansing, Mich., has recently put on the market a well-developed and perfected automotive rail car stated to contain all the characteristics necessary to make it adaptable to railway spur line work in practically every section of the country. The difference in the cost of operating a coal burning steam locomotive and one or two passenger coaches and this type of vehicle is incomparable, in view of the equal service.

The special Duplex power unit contained in this car comprises the same type motor used in the Duplex motor buses. It has been designed and built especially for rail operation where heavy duty and constant service is employed.

The front end of the car is supported by a four-wheeled truck carefully balanced and designed to travel at high speed with minimum side sway and vibration. Brakes have been provided on all four of the front wheels as well as on the rear wheels acting through equalizers, which apply the force equally under pressure. Flanges of wheels are of chilled steel.

The power drive of the rail car is a worm and ring gear. Bearings throughout are of the automotive type, roller bearings being used in the wheels, annular ball bearings in controller box and drive shaft. The diameter of the front wheels is 20 in. and that of the rear wheels 26 in. The arrangement of both front and rear trucks has been made with an idea toward com-

fort and safety on curves at high speeds.

The entire mechanism is operated by one man stationed in the right front compartment of the car where all controlling levers are within easy reach.

Seating accommodations are provided for 32 passengers. The majority of the seats are arranged transversely, the only longitudinal seats being one in front near the service door on the right, and one on either side over the rear axle.

The interior of the body is finished in ash and cherry. The seats, floor mat strips, ventilators and many other details conform to construction standards of steam and electric cars. Current is supplied by a storage battery used for illuminating purposes only. This furnishes light for the interior of the body as well as for the 12-in. headlight. A separate battery supplies power for the starting motor.

Side and end window sash are of the

double type, the upper part being stationary and the lower part easily raised and lowered. Folding doors, on either side, controlled by the driver from his seat in the cab, enable passengers to enter and leave the car directly on to the platform of the station. Each car is supplied with an adequate heating system connected with the exhaust of the motor.

Special types of bodies are designed to conform to local requirements of traffic for each particular installation. These include combination passenger and baggage cars, with accommodations for 21, 26 and 29 seated passengers, having a baggage compartment of from 4 ft. 6 in., to 6 ft. 6 in. in length; combination passenger and freight cars, with accommodations for 21 seated passengers in the closed body, with a 7 ft. 3 in. platform with stake sides for hauling freight and a combination baggage, express and mail car with suitable compartment for partitions, including a separate one for the operator.

For service on such branch railroads where the baggage or freight is sufficiently large, a separate trailer has been designed. These units vary in size and type, according to local conditions to be met.

Service Builds a Special Railway Motor Coach

IN the latest design of the railway motor coach built by the Service Motor Truck Co., Wabash, Ind., for a railroad company down in Tennessee, a

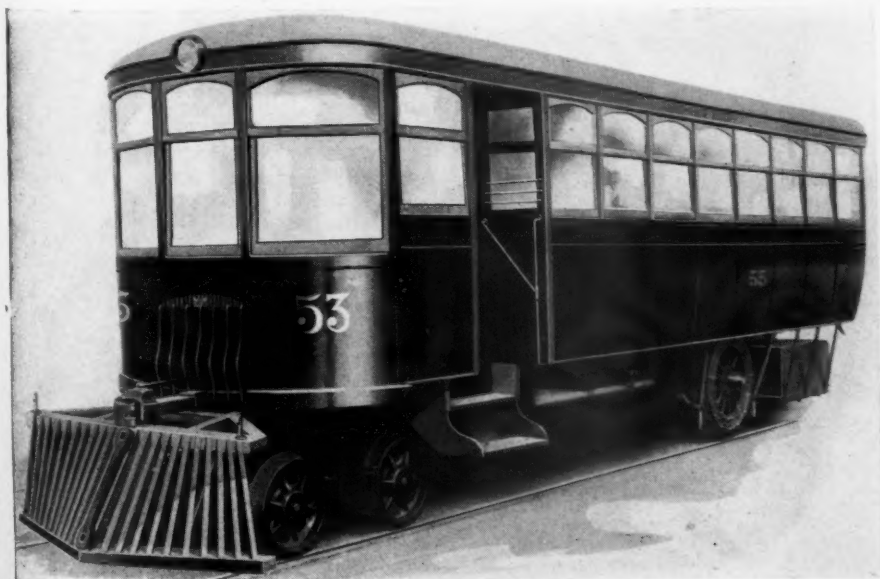
marked improvement in design over the original built for this company in 1914 is strikingly noted. The original, which is still in operation and was built on a one and a half ton truck, is today an impossible looking outfit, as is very natural in view of the intervening years of bus improvement.

The present design, which is reproduced herewith, is a smaller type of coach, having a seating capacity of thirty passengers, a normal speed ranging from 25 to 30 m.p.h., depending upon the gear ratios and local operating conditions.

Gear ratios are varied, according to the requirements of the grades and curves of the particular road over which the car is to operate.

The chassis is especially adapted for rail operation and the front axle is replaced by a four-wheel pony truck, having chilled iron wheels, solid car type axles, plain brass bearing and swing motion bolster. The rear axle is worm-drive type, fully inclosed and running in oil. The wheels are 32 in. outside diam., fitted with M. C. B. standard rolled steel tires.

A special transmission is provided so that this car has four speeds forward and four speeds reverse. While the car is normally intended for operating in the



Special Duplex for Railway Spur Line Work

forward direction, it can, if necessary, be backed at full speed—as in backing into a terminal.

The engine is a $4\frac{1}{4} \times 5\frac{1}{2}$, four-cylinder, motor truck type, capable of developing 40 hp. at its rated speed of 1400 r.p.m.

The clutch is single plate type, driving to a special reversing transmission through fabric universal joints. From the reversing transmission the power is taken by additional fabric joints to a four-speed amidships transmission, and then by metal joints, fully inclosed, to rear axle.

One feature of this car is that all major bearings, such as wheel bearings, worm bearings, transmission bearings, as well as engine main bearings and connecting rod bearings, are adjustable for wear.

The coach work consists of a bus type body with entrances provided on both sides near the front end, and controlled by the motorman from his position. The

New Trolley Bus Introduced by a Western Trolley Company

THE St. Louis Car Co., recently completed a trolley bus which presents a number of attractive features. The bus was built for exhibition in connection with the proposed installation of trolley buses in Detroit, to take care of districts where service is infrequent. The electrical equipment was supplied by the Westinghouse Electric & Mfg. Co.

An important feature of the construction is that the body is built directly on the chassis frame, thus avoiding the duplication of frame members.

The wheelbase is 194 in., and the overall length of the bus is 26 ft. Nine cross

exit door is directly at his right. Foot operated band brakes are provided on all four wheels, and a separate pair of hand operated emergency band brakes are supplied on the rear wheels. The total weight of the bus equipped is approximately 10,500 lb.

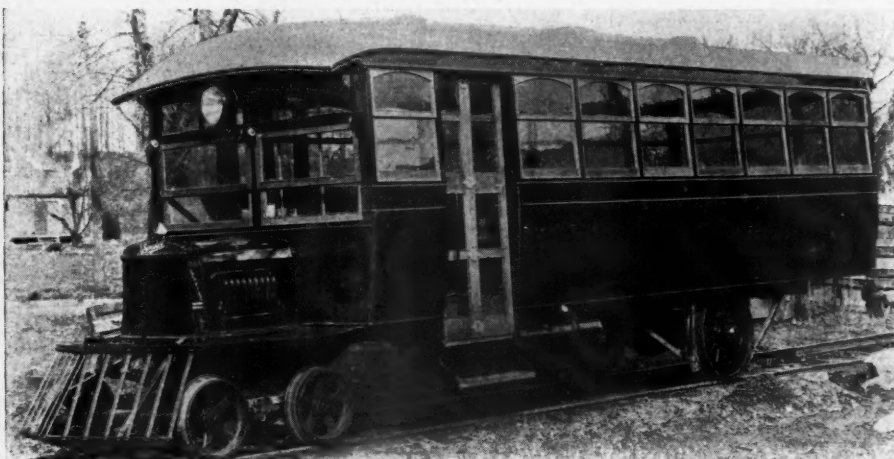
Two Westinghouse type 506-AN-2, 25 hp., ball bearing motors are used. The motors are mounted beneath the body and are connected in tandem with a short shaft and "splicer" universal joints. The connection is made from the rear motor through a propeller shaft and universal joint to a Wisconsin worm-drive axle, having a gear ratio of 6.5 to 1.

The control apparatus is mounted underneath the hood, which location provides for easy inspection.

The control is of the series parallel type. Eight magnetically operated switches give the necessary combinations for four steps and three in parallel. The control is operated by means of a foot pedal, which is pivoted at a point under the center of the foot, so that the foot rests comfortably at all times on the pedal, and a slight rocking motion forward and backward controls the various steps. There are three operating positions to the foot pedal, which are indicated by "feel" to the operator by a star wheel provided on the foot operated controller. The pedal is returned to the "off" position by means of a spring.

The automatic progressive action of the control is so arranged that it is slowed down, as the load on the main motors is increased, but under no conditions is it entirely stopped.

Reversing is accomplished by means of a simple knife switch type of reverser, which is mounted on the front of the dash, under the hood, with its handle projecting through the dash in a convenient position near the operator.



This Latest Railway Motor Coach Built by the Service Motor Truck Co. for a Tennessee Railroad Company Shows Marked Improvements in Design

seats are rattan covered, with spring bottoms. Lighting is by electric generator and storage battery, lights being adequate for reading.

Gasoline capacity is 40 gal. Steel locomotive type pilot is provided. Front fenders are also built over front truck. Two sets of brakes are provided—one operated by foot pedal, the other one operated by hand lever acting on the rear wheel drums. Brakes on the front truck can be provided at an additional cost. Hand operated mechanical sanders are provided on both sides of driving wheels.

The rear wheels are of a special Mead cushion type, developed for railroad work. These wheels, together with the swing motion front truck and other cushioning features, such as fabric joints, combine to give a smooth, easy riding car. The price of this car is \$8300 f.o.b. Wabash, Ind.

On an experience of over 25,000 miles in actual service, this car has shown the following results: Normal speed, 30 m.p.h.; gasoline consumption, 10 miles per gal., and oil consumption, 400 miles per gal. The total cost per day on a round trip of 84 miles, was found to be under \$10. This includes all expenses up to date for crew, gasoline, oil and maintenance.

Hill climbing ability, 2 per cent grades on high gear; 4 per cent grade, pulling a trailer weighing a total of about 6 tons, loaded, on third gear at 15 m.p.h.

and two longitudinal seats are provided, giving a seating capacity of twenty-nine. The seats are deeply upholstered and provided with easy springs, which add greatly to the comfort of the passengers.

The driver is located at the front on the left hand side, and the entrance and



The Trackless Trolley Bus is Another Development of Bus Transportation

An overload trip opens all of the magnetic switches in case of excessive loads. The overload trip is mounted on the dash, under the hood, and can be tripped or reset by the operator by means of buttons located on the dash, within his reach.

Two separate overhead collectors are provided, which are similar in construc-

tion to the standard trolley used on light traction cars, except that they are provided with ball bearing swivel harps.

The collectors will permit a deviation of 10 ft. on either side of the overhead wires. The bus is equipped with electric heaters, electric lights and electric signals as employed on regular cars.

ance, and provides safety for the car and its passengers.

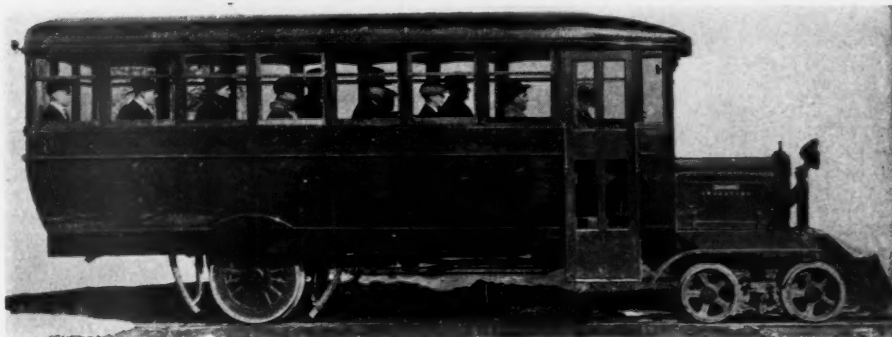
Mechanically the chassis is practically identical with the regular Indiana truck chassis with such changes as are necessary to adapt it to the requirements of rail service. Note the sanders that are provided on both sides of the driving wheels, the pony truck with brake arrangement, the fenders and cow-catcher.

The car is operated by one man who acts both as motorman and conductor. To the right of the driver's seat is a single door for both entrance and exit, operated by the motorman. A powerful electric system is an integral part of the car. This

Indiana Truck Corporation Introduces New Railway Bus Car

THE accompanying illustration is that of a thirty-passenger bus car that plies its way back and forth across a 55 mile line between Gallipolis, Ohio, and Parkersburg, W. Va., in the service of the Gallipolis & Northern Traction Co. It was built by the Indiana Truck Corp., Marion, Ind.

The wheelbase of this railway bus car is 180 in., and the body is considerably longer. The conventional motor truck wheels have been replaced by a special four-wheel pony truck in front, and heavy wheels with steel flanges in the rear. In front of the radiator which is of the regular truck type is a conventional pilot, which gives the standard railway appear-



Designed and Equipped for Railway Service This Indiana Motor Bus Serves Two Communities 55 Miles Apart

provides current for starting the engine, lighting the passenger compartment, and the strong headlight.

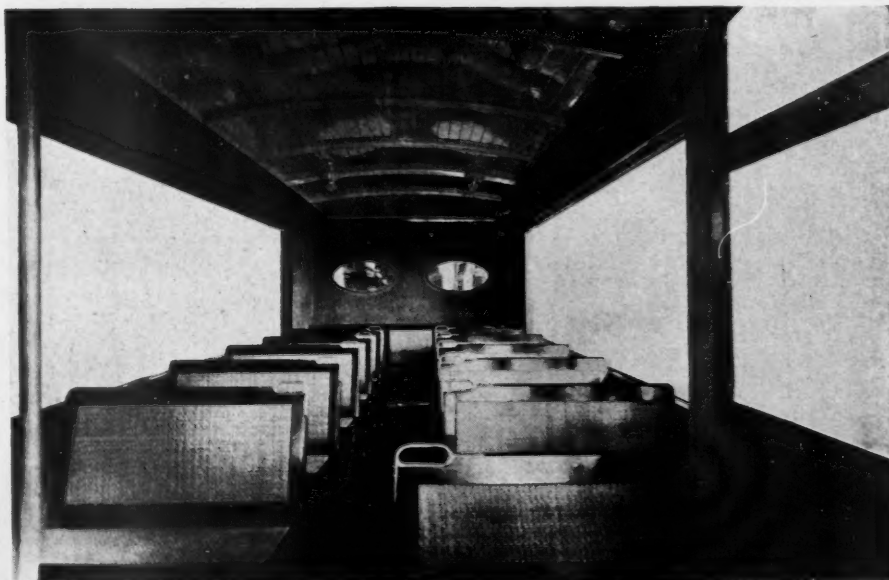
Will the dealer sell
the bulk of motor
buses in the future?

Read the article on page 21



This Bus Insures Comfort Both Winter and Summer

This illustrates a special bus recently announced by the United States Motor Truck Co., of Cincinnati, Ohio. The body, built by the Cincinnati Car Co., is mounted on a Model R 8000 lb. capacity United States chassis. The body is of steel construction, heavily braced throughout. The job is equipped with electric lights, starter, power tire pump, and Firestone cord tires. A special feature is seen in the sliding window lights on both sides. In summertime, unless provisions are made for entirely removing the windows, the interior of some bus bodies becomes extremely uncomfortable. This is avoided in this job by sliding the windows to the rear of the body where they fit snugly in a compartment on either side. This leaves both sides of the bus wide open. The seats are arranged crosswise. The body is wide and provides ample aisle room.



Eight-Wheel Bus Latest Innovation in Bus Design

WHILE the vehicle, illustrated herewith, is a radical departure in design and construction from those now in use, it is generally conceded by those who have seen it that it has many features which destine it to take the place of the large four-wheel stages now in operation on the Pacific Coast.

The stage was designed by R. B. Fageol (not the Fageol Motor Truck Company), of Oakland, Cal. It weighs 8000 lb., is equipped with a four-cylinder, $4\frac{1}{2} \times 5\frac{1}{2}$ engine especially designed by Mr. Hall, of Hall Scott, and is capable of making 50 miles an hour.

It has run over 2400 miles since being built, just recently returning from a 1500-mile test run, without having a single puncture or without giving any trouble whatsoever. It averaged ten miles to the gallon of gasoline.



This Eight-Wheeled Bus is One of the Most Novel Contributions to Motor Bus Construction. It is a Specially Designed Proposition Throughout and Contains Many Universal Features

It steers on all four front wheels, and drives and brakes on all four rear wheels.

The eight wheels have many advantages over a four-wheel stage.

If one axle is broken the other axle will maintain the car until a new axle is supplied, thus eliminating the danger of accidents due to broken axles.

If the front tire blows out the machine still has three front tires to steer with instead of only one, as would be the case with a four-wheel bus.

While operating the stage at 25 miles an hour on slippery pavement the driver tried to skid the machine by throwing the clutch out and putting on all brakes, but the machine did not skid, thus showing that skidding is greatly reduced by the use of eight wheels.

By using eight wheels, smaller wheels can be used, and by reason of this the center of gravity of the bus and load is very low, eliminating a great deal of danger of instability.

When traveling at 48 miles an hour the eight-wheel bus was driven around a curve and the swaying of the body was not perceptible, this being due to the special features embodied in the chassis and special spring suspension.

In passing over a series of railroad tracks at rapid speed the passengers feel only a flutter, due to the spring suspension, and due to having eight points striking, because of the eight wheels.

It is thought that there is less than half the strain on the pavement as on a

four-wheel bus, due to the eight bearing points and 50 lb. of pressure on the tires. These tires carry 70 lb. of air against 120 of the four-wheel bus.

The luggage compartment is built into the rear of the body, being a part of same. Below the baggage compartment is a special compartment for two tires and rims. A substantial steel spring bumper extends around the rear end of the bus, protecting the rear. There are five cross seats with a door for each seat. The driver's seat has a door on each side.

Special White Chassis and Bodies Developed in Bus Service

ASPECIAL type of motor bus having new features of design expressly designed for passenger transportation, was recently brought out by the White Co., Cleveland, Ohio. The new design is one of the first in which both

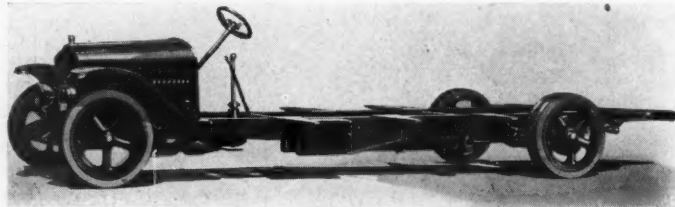
of the bus in new classes of service, have brought out many new operating problems which are met best by special design.

The new White model has a wheelbase of 198 in., making it possible to mount, without excessive overhang, a body which has comfortable seats for 25 passengers. Long and flexible springs, a low center of gravity and the long wheelbase, combine to make riding easy. Because of its low loading height, only one step is needed at the entrance. Passengers can enter or leave rapidly, so that stops are short and fast schedules can be maintained.

Two types of bodies have been designed for the bus chassis—one known as a city type, and the other an interurban type. Operating companies, however, can secure other types of bodies if desired.

The city type permits of great freedom of movement about the interior and eliminates "choking" at the entrance. The interurban type is designed for the utmost comfort of passengers on long trips, with ample space for luggage. Both types have wide double doors at the front and an emergency door in the rear. Modern heating and ventilating systems are installed.

Standard equipment includes generator and electric lights, side braces on the frame, steel wheels and solid tires, single in front and dual in rear. This tire equipment is especially adapted to operation on city streets.

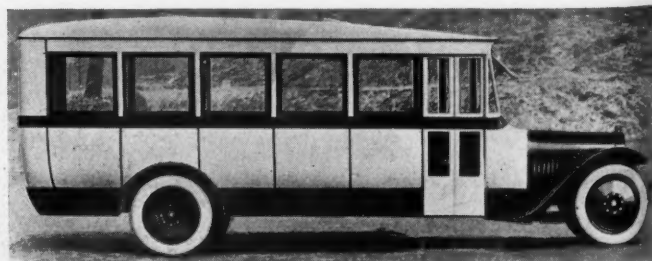


Standard White Chassis

It has a 198 in. wheelbase and is powered by a 50 h.p. unit power plant.

Side View of the White Bus

The city type provides seats for 25 passengers and the interurban, 22 passengers.



Bus Service Constantly Grows in Popularity

THOUSANDS of motor trucks will be needed for bus lines, and thousands more will be sold to industrial concerns as a result of analyzing their businesses. The motor bus can be a distinct aid to electric railway systems and is rendering such service to a great number of communities. Suburban routes can be served by motor bus when it would not be worth while for the elec-

tric company to build spur lines for rail lines.

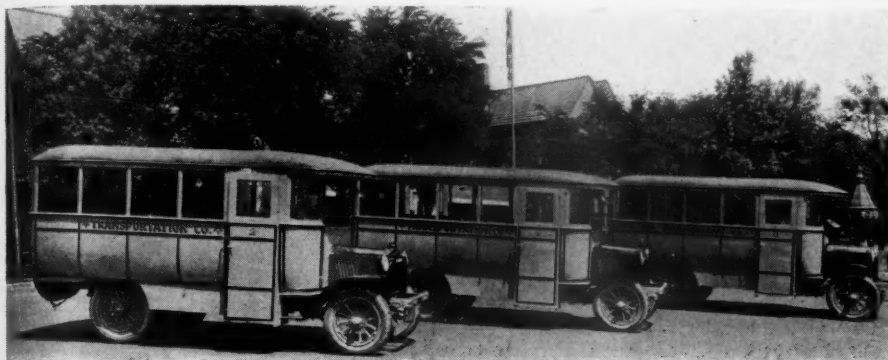
of patron opinion in the community served by these buses indicates complete satisfaction in service rendered. The bus bodies used by the Star company were made by Miscampbell, Duluth, Minn., and are very unique in construction and appearance. They are of rattan finish, with drop windows, and entrance at right of driver's seat. The door is controlled by the driver. Although

the capacity of the buses is twenty, during the rush hours as many as thirty people are carried. Each bus carries advertising space for twenty cards, street car style. Light is furnished from electric ceiling dome lights.

Special lockers carry tools and extra equipment, and a spare tire carrier is attached at the rear of the chassis. Pneumatics are used both front and rear, which use materially adds to the comfort of the riding passenger.

Motor Fees Are Applied for Building Good Roads

Of \$108,213,165.35 collected in registration fees from 9,245,195 passenger cars and commercial vehicles, 28,114 trailers and 177,234 motor cycles, as well as chauffeurs' licenses in the 48 states and the District of Columbia, January 1 to July 1, 1921, according to the U. S. Bureau of Public Roads, the sum of \$101,793,416 or 94 per cent is available for good roads. The total revenue for the year 1920 in registration fees was \$102,546,212.25. The revenue for the first half of last year, therefore, exceeded the entire revenue for 1920 by \$5,666,953.08. Of the 9,245,195 registered vehicles, 8,363,427 are passenger cars, 844,110 trucks, and 37,658 are taxis and buses.



These Buses Render Suburbanites of Mason City, Iowa, Reliable, Clean and Economical Transportation Service

tric company to build spur lines for rail lines.

To what extent the motor bus is dovetailing into the business of the railroad is not at this time authoritatively known. There are, however, distinct shining examples all over the country of installations of bus lines that are profitably serving large communities satisfactorily.

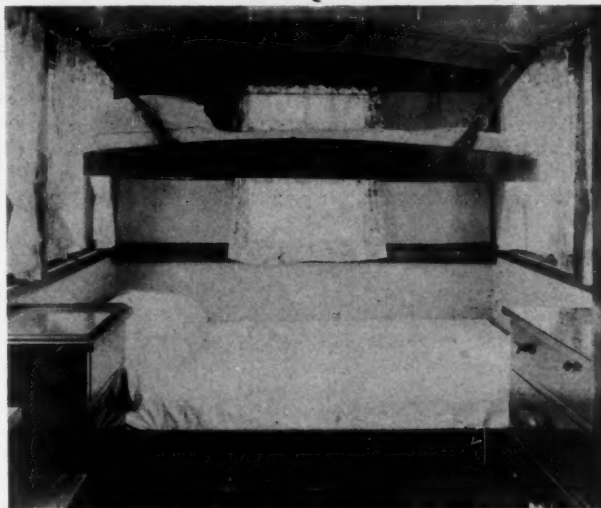
Motor buses are also sometimes profitably used when the question of retrackage has to be considered. The investment needed for the motor vehicles may well be far less than the cost of rebuilding the roads, especially when the traffic on the particular line is light.

A noteworthy example of satisfactory service rendered a large community by bus service may be had in the short career of the now solidly established Star Transportation Co., of Mason City, Iowa. This company operating three Model 33, 1½-2-ton Denby buses, maintains regular service between Garner and Charles City, Iowa, via Mason City, a distance of 52 miles. The running time of two hours, forty-five minutes, which is scheduled time for the trip, is comparatively brief, particularly in consideration of ten stops made en route. Train connections are also considered in the schedule.

Five operators are used, and definite instructions regarding operation of buses to insure safety for passengers are rigidly enforced. Each bus operator has before him definite orders regarding his particular run as to road conditions, rough spots, detours and speeds at which to operate at certain locations. He, likewise, has information to show him exactly where the other buses are at any time, in order to facilitate transfer and aid, if needed. Taking all in all, the consensus

Future Motor Tourists to Have Kitchen, Bedroom and Conveniences at Their Disposal.

This motor home is in reality a two-room apartment on wheels, with all modern luxuries—with the exception of steam heat and running water. It will accommodate three adults, who can cook, eat, sleep, and live in it with perfect comfort and ease. Folding glass doors separate the kitchen from the bedroom and insure perfect privacy. In the bedroom is to be found a dresser and comfortable beds which are converted into davenports during the daytime, pullman-style.



Sight-Seeing Bus Gets Pick of Excursion Business

RUNNING a sight-seeing bus is a profitable business, if you have a good bus and run it properly," says Charles L. Cook, of the Charles L. Cook Bus Company, 1905 Walnut St., Milwaukee.

"Because there is money in the business there is a lot of competition. One of the main things is to get the jump on your competitors. This requires a dependable chassis and an attractive and comfortable body. On July 1, 1920, I purchased a 2½-ton Atterbury chassis with a long wheelbase for which I designed and built a body.

"Every afternoon, including Sunday, the bus meets the Goodrich boat when it comes in from Chicago. Shortly after the boat is docked, the bus is loaded to capacity.

"The bus is always loaded and on its way long before any of the other buses are half full. It takes a little over an hour for the bus to cover the sights of Milwaukee and return to its starting place, having traveled 16 or 17 miles. In addition to the passengers obtained from the steamboat, there are usually enough other visitors in Milwaukee to fill the bus for two more trips a day.

"I average a full load of 28 passengers. As each passenger pays \$1.00, the bus takes in a total of \$28.00 a trip, or \$84.00 for the 3 trips made each day. The sight-seeing bus business in Milwaukee is good for about 5 months in the year, making my total income \$12,600. If the truck is laid up during the winter, the annual cost of operation would be \$4,273.95, which would make a net profit of \$8,326.04 for only 5 months' work.

"It seems to me, however, that it is poor business to allow a \$7,856 investment to stand idle for 7 months in the year, and I am figuring a way to keep the truck busy all winter. In a city the size of Milwaukee, with a population of 525,000, there are between 25 and 30 funerals each day. The bus is so well known for its appearance and comfort that I figure on at least three funerals every day. Here,

again, with 28 passengers each time, at \$1.00 apiece, the truck would be earning \$84.00 a day the year round.

"On this basis my total operating cost would be \$24.26 a day, allowing for a run of 50 miles per day, as in sight-seeing bus work. However, the daily mileage in

funeral work would probably be considerably less. This naturally would increase the profit. But even if the bus did run 50 miles per day, my profit would be \$59.74 a day, or about \$18,220 a year.

"During the period from July 1 to August 13, 1920, my bus worked 44 consecutive days, and traveled a total of 2,200 miles. In this time it made 132 sight-seeing trips, and carried a total of 3,696 passengers. On the National Standard Truck Cost System basis, my cost for the period is \$21.85 per day, or \$3.70 per mile.

Selden Designs Two New Motor Bus Units

AFTER considerable investigation into the needs of the passenger transportation business, the Selden Truck Corp., Rochester, N. Y., have introduced two new chassis, units Nos. 31 and 51.

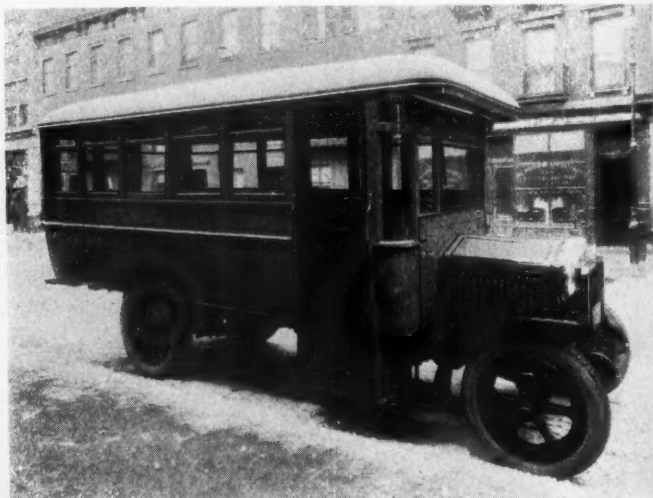
One of the features of these jobs is the method of assembling. Each member is so mounted that it will be held in line and yet have sufficient play to absorb shocks and strains. It is pointed out that this method of assembly is particularly valuable in the motor bus business, as it provides additional cushioning and thus adds to the passenger's comfort, and also, keeps repairs at a minimum by protecting the more delicate parts.

Unit No. 31 is rated at 2½ tons, has a wheelbase of 147 in., and a space of 14 ft. 8 in. back of the dash. It is built for a body having a seating capacity of 18 passengers, with standing space for prob-

ably 18 more. Left-hand drive is standard.

The engine is a special Continental, 4½ x 5¼, equipped with special warming device and water syphon. The transmission is in unit with the engine and has four forward speeds. The clutch is the multiple disk type with 11 disks.

The Selden full-flexible frame is used with all units flexibly mounted and having bolted construction throughout. Malleable iron wheels are standard with pneumatic cords, 34 x 5 front and 38 x 7 rear.



Exterior View of the Model 31 Selden Bus



Comfort and Attractive Appearance Make This Sight-Seeing Bus the Most Popular in Milwaukee, Wis.



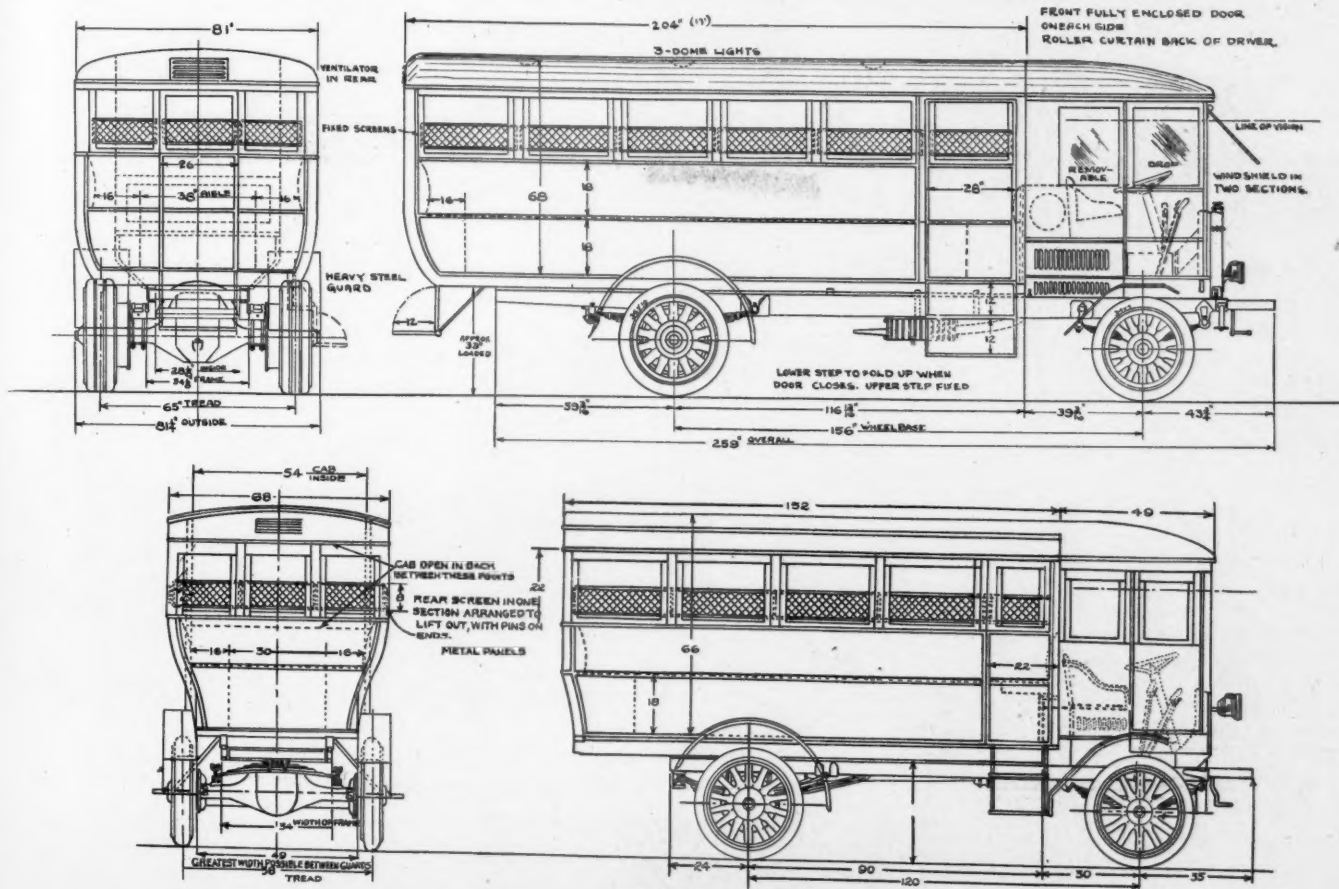
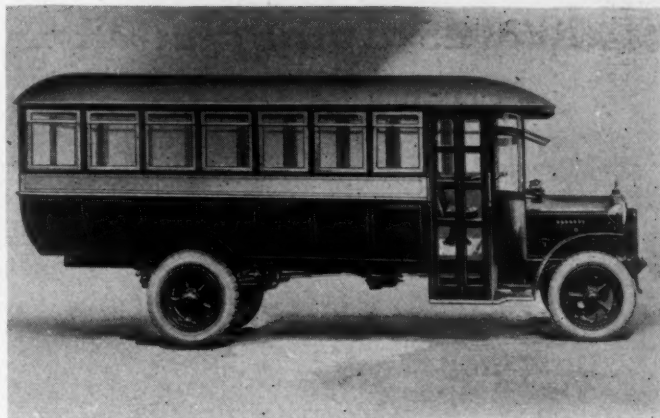
Interior View, Showing the Arrangement of Seats, Upholstery, Supporting Ceiling Rails, Electric Lights, Etc.

Unit No. 51 is rated at $3\frac{1}{2}$ tons, has a wheelbase of 179 in., and 17 ft. 5 in. space back of the dash. It is built to carry a body having a seating capacity of 30 passengers, and 30 standing.

The engine is a Continental, $4\frac{1}{2} \times 5\frac{1}{2}$. The transmission is mounted amidship and has four forward speeds. The clutch is the multiple disk. Similar to lighter model the frame is full-flexible. Steel wheels are standard with pneumatic cords 36 x 6 front and 40 x 8 rear.

Two gear ratios are furnished in both models. Where power is needed and less speed required, a $7\frac{3}{4}$ to 1 ratio is provided, giving a speed of 18 m.p.h. The standard chassis has a 6 to 1 ratio, giving a speed of 25 m.p.h.

This Selden Bus, Known as Model 51, is Rated at $3\frac{1}{2}$ Tons, Has a 179-in. Wheelbase and 17 ft. 5 in. Space Back of the Dash



These Illustrations Show the Specially Designed School Bus Bodies Built by the Autocar Co., Ardmore, Pa.

The half-tone illustration shows the smaller capacity school bus mounted on the 2-cylinder Autocar chassis. Dimensions of this body in addition to dimensions of the school bus body designed for the 4-cylinder Autocar chassis are given in the two blueprint reproductions. In the smaller model, doors are provided on both sides and open from the outside. Only one front door, arranged on the right side and operated by the driver, is provided in the larger model. An emergency door, however, with automatic drop step is furnished at the rear. Among other details are: Removable cushions, covered with Pantasote; all windows to drop into panels; permanent screens on inside; and cocoa mat on floor.

Edwards Combination Passenger and Baggage Car

THE urgent need of developing a transportation unit that would provide adequate, reliable and dependable service with low cost of operation to meet destructive jitney competition prompted the Edwards Railway Motor Car Co., Sanford, N. C., which

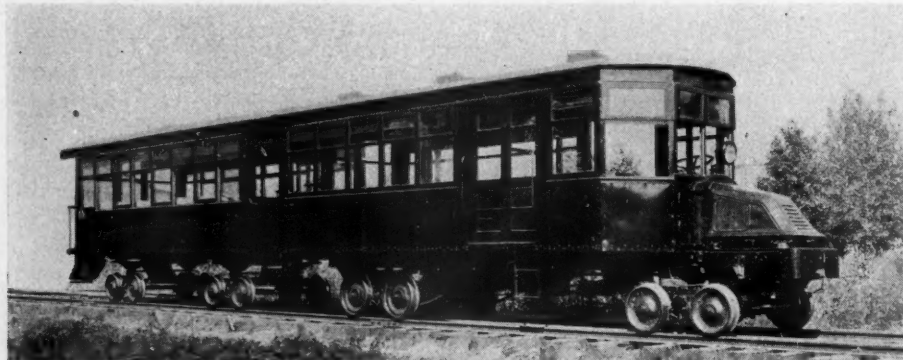
wheels are all arranged similar to the American type of locomotive. Power is applied to all four driving wheels by three chains. Steel bodies, which are not only substantial, but attractive in appearance, are used on all these jobs.

In order to free the driving members

from the vibration and shock resulting from conventional rear-end assembly, power is transmitted to the rear driving wheels through chains. This method is said to effectually cushion and absorb all rail shock. The braking system is also efficient; action taking place at all wheels of both motor car and trailer.

The body is built with arrangements for the comfort of passenger, including ample electric lights, comfortable upholstery, curtains, roof ventilators, and exhaust or hot water heat for cold weather. The windows raise as in regular steam cars.

This car can be geared to make a speed as high as 45 m.p.h. When the grades are as high as 4 per cent the car is geared for 30 m.p.h. The engine is equipped with self-starter, storage battery and generator.



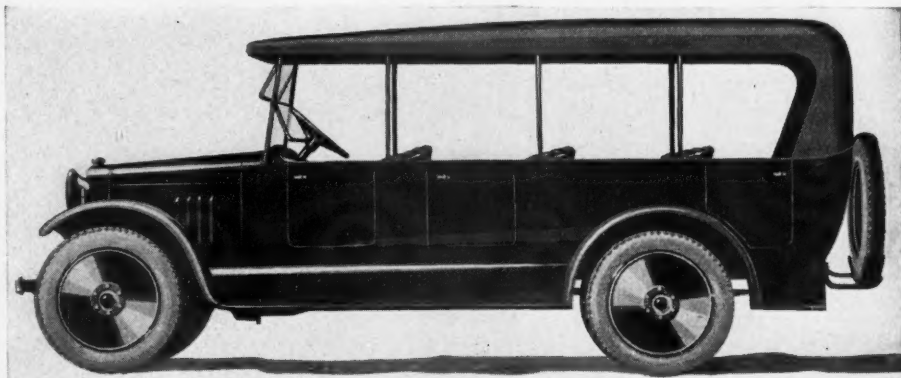
Combination Passenger and Baggage Outfit Seating 50 Passengers and Has 70 Square Feet for Mail, Express and Baggage

concern also owns and operates several short-line railroads, to bring out a railroad motor car. The original car, constructed four years ago, still operates on schedule time.

The latest model, however, is announced as being real railroad equipment, developed by railroad men working in conjunction with automotive engineers.

In order to provide ready replacement only standard units are employed. The engine, clutch, transmission, differential universal joints, etc., are made by the Springfield Motor Truck Co., Springfield, Ohio.

The car is supported on four driving wheels in the rear, and a four-wheel pivoted pony truck in the front. The



This Job is Both Sumptuous in Appearance and Commodious in Design



DeLuxe Bus Body Mounted on a Federal Motor Truck

This body which is offered in three different lengths is stated to be a well-balanced combination of minimum weight and durability. The standard body is six feet two inches wide over all and has two seating arrangements: side seat and cross seat

Commerce Char-a-Banc Ten-Passenger Car

The Commerce Motor Car Co., Detroit, Mich., in announcing its latest product, the Commerce Char-a-Banc, for the accommodation of ten passengers, stresses particularly the luxurious and

comfortable body features, low cost of operation and depreciation, and also the fact that the units entering into the construction of the chassis are designed especially to meet the extra requirements placed on them. It is pointed out that this job may be employed for service in stage routes, rural and urban transportation, sight seeing, depot and hotel transfer, and for club or resort transfer.

Attractive appearance is obtained through streamline effect. The seats, which are full size, are equipped with Marshall springs and upholstered in long-grain leather. The body is equipped with two sets of curtains, one of which are storm curtains for use in warm, inclement weather. The other set is equipped with crystal glass, constructed to open with doors for use in cold or winter weather. Although of permanent construction the top can be removed as entire unit, or folded back.

The price of this job is \$2350 f. o. b., Detroit.

Motor Bus Must Have Ample Spring Capacity

By S. P. HESS, M. E., Detroit Steel Products Company

MORE attention must be given to the correct leaf spring suspension on motor buses than has been given in the past. This applies to the electric or gasoline type; the slower speed city bus or the higher speed rural bus. The public's demand for ease and comfort can no longer be ignored. Motor bus engineers are recognizing these facts and are being governed accordingly.

Among the various types of motor buses, those equipped with solid tires present the more efficient solution. Pneumatic tires absorb certain road shocks, in particular the small irregularities in the paved city streets or rural highways. But in order to eliminate the service tie-ups due to repair problems, as applied to pneumatic tires, many buses are being equipped with solid tires or some form of cushion wheels. This we find applies particularly to buses used in large cities.

Motor buses may be considered in the passenger car class, of an over-sized capacity. Therefore, the front and rear springs must be designed with a width and length which will give the desired flexibility and consequent comfortable riding qualities. The flexibility will bear a similar relation to sprung and unsprung loads as is considered in the design of passenger car springs. By way of illustration, we have in mind a trackless trolley bus, maximum capacity 42 passengers, equipped with a 3 in. x 44 in. front spring and a 4 in. x 64 in. rear spring. These dimensions were found necessary to get the desired results.

Watch the load clearance very carefully as this determines the travel the spring may have under extreme conditions. A spring designed for a given static load may fail if the load clearance is too great, as it allows too great a stress range.

Motor buses must be designed to give as near 100 per cent continuous service as possible. This is not only necessary from an economical standpoint, but as a public carrier, the public expects it. Therefore, all units and equipment, not to forget springs, must be made of the best mate-

rial applicable to the part and designed with a liberal factor of safety.

Motor bus springs should be made of a high-grade alloy steel, such as electric furnace silico-manganese spring steel. It must be carefully selected and given a proper heat-treatment to obtain the maximum value from the steel. It is always more economical to spend a little more on the initial cost of the springs and cash in on the investment than to have the bus continually laid up for repairs on account of spring troubles.

Spring shackle bolts should be of liberal size so as to distribute the load of pressure without undue wear on the bronze bushings or bolts. Provide means

to lubricate the shackle bolts at all times. Springs should be free to move where movement is expected. Therefore, prevent tight fitting shackle bolts and allow free action of the shackles. Seat the springs firmly to the axle seats by means of stout chrome nickle steel axle clips, heat treated so that the springs will not get loose after the tightening and cause breakage at the center bolts.

Motor buses should be equipped with radius rods and torque arms. The continual starting and stopping of the bus to take on passengers, will cause great intermittent driving and torque strains on the rear spring, if these units are eliminated. If this additional work is expected of the spring, riding qualities will be sacrificed. A broken front eye on a rear spring, caused by driving strain, will put the bus in the repair shop.

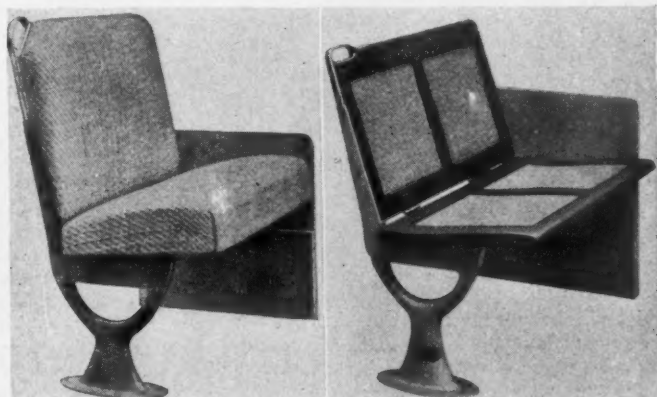
The motor bus industry is still young. Its field is broad and there is practically no limit to its use if the units are properly designed.

Heywood-Wakefield Bus Seats

The accompanying illustrations show two styles of the great variety of seats manufactured by the Heywood Bros. and Wakefield Co., of Wakefield, Mass., for bus use. These seats are made in various sizes to meet the requirements of all capacity buses. Special attention has been given to the upholstery which is exceptionally heavy, and the absence of pockets, which collect dirt, makes these seats thor-

oughly sanitary. The 8 C-3 rattan seat illustrated is made to standard specifications as follows: Length over all, 32 in., or as specified; 18 in. back; non-lifting fixed type, spring edge cushion, depth 15 in., height from floor to top of cushion, 17½ in.; Bay State bronze handle; the spring work consists of a flexible spring top over crucible steel springs; the support and end plates are of pressed steel; metal parts finished in olive green. These specifications may be altered to suit requirements.

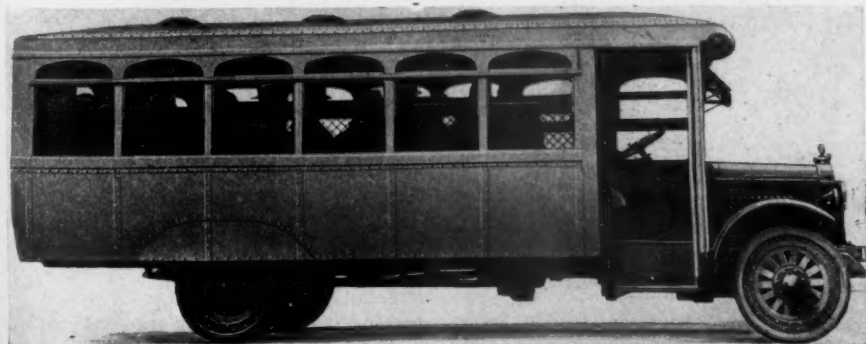
Heywood - Wakefield Rattan Bus Seats, Showing the No. 8 C-3 Rattan Seat and the No. 6 P. Rattan Paneled Seat.



Marion Rubber in New Hands

The Marion Tire and Rubber Co. has been purchased from its trustee, Jesse P. Dice, by the Studebaker-Wulff Rubber Co., Marion, O. The company will gradually develop the production of special cord tires to be known as Studebaker-Wulff cords.

The Marion plant is under the direct supervision of H. C. Buchanan, a director of the company and formerly production superintendent for the Kelly-Springfield Tire Co., of Akron, O. Other officers of the company are P. E. Studebaker, president; B. F. Wulff, secretary and general manager, and F. A. Rendon, vice president.



View of the New Republic Knight-Motored Bus, Details of Which Will be Announced Later. Seating Capacity of This Job is Twenty-five Passengers

TRUCK EQUIPMENT AND APPLIANCES



Including Special Motor Bus Equipment

Clark Offers Exclusive Motor Bus Axle Line

A complete line of specially designed motor bus axles is being built by the Clark Equipment Co., Buchanan, Mich., a concern long identified with the manufacture of quality motor truck axles.

This company, for years, has been building bus axles, having been connected with this phase of the industry with some of the largest motor bus companies in America.

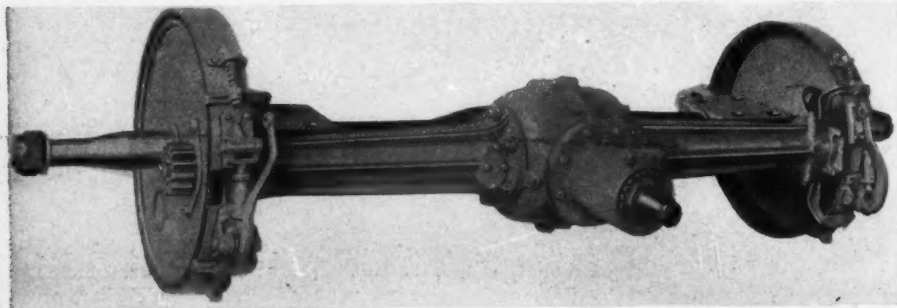
Investigations made by the research engineers of the company showed the need for specially designed chassis for motor bus work. This particular line of motor bus axles has been added to, until today it consists of four special motor bus axle models, suitable for use under buses accommodating from ten to sixty passengers.

The feature of these bus axles is an exceptionally wide tread, so as to enable the bus builder to construct a bus with a low center of gravity. Axles are also equipped with gear ratios suitable for the different conditions under which the buses have to operate. Particular care, also, has been taken to insure adequate braking facilities.

The models of this line are identified by the following model numbers: 1 D Bus Axle for buses with 10 seated and 10 standing; 2 D Bus Axle for buses with 20 seated and 10 standing; 3 D Bus Axle for buses with 30 seated and 20 standing, and 5 D Bus Axle for buses accommodating 40 to 60 passengers.

It will be noted from the above axles that provision has been made for standing passengers—a factor which is overlooked in many motor buses.

This company is also building bevel drive axles suitable for small motor buses, taxicabs and motor stages.



Clark Motor Bus Axle

Especially built for buses carrying 50 passengers (30 seated and 20 standing)

The minor refinements of these axles have been designed with the idea of providing driving units which will require the minimum of service. Accessibility has been designed into all parts.

Buda Offers New Motor Bus Engine

The Buda Company as a result of its investigations has developed an engine for motor bus operation containing power characteristics necessarily apart from the conventional motor truck engine.

High torque ability over a wide range of engine speeds with economy of fuel and oil and the ability to endure under long periods of operation have been found vital to this service. Accessibility for inspection, repair or service, is another dominant requisite of a bus engine. Some of these details are embodied in the brief outline following:

To give smoother operation at the higher engine speeds, crankshafts are specially balanced on Olson-Carwen special crankshaft balancing machines. The crankshaft and lower connecting rod bearings in these engines are of a new thermal bridge radiated type.

Thermal efficiency of the engine is said to have been improved materially by reason of a Fulton Sylphon thermostat, which is located at the outlet elbow on top of the cylinder head.

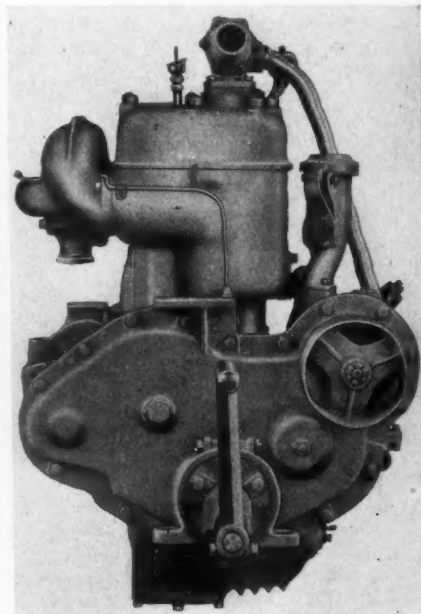
A vacuum controlled oil pressure regulating device is used that automatically controls the pressure of oil to the bearings in direct ratio with the load on the engine.

Increased power and lower fuel consumption is said to be obtained by a new type of manifold that delivers fuel in perfectly dry state to the combustion chambers.

The cylinder heads have been specially

designed for greater water capacity and uniform compression space with a consequent added smoothness of operation.

The cylinders are cast in block of grey iron, and provided with ample water jacket space which is baffled so that water is discharged directly beneath the valves. The removable cylinder head is secured by alloy steel studs. Spark plugs are located in the head. The cylinder head is provided with a ledge projecting beyond cylinder block, which feature makes the removal of the cylinder head easier.



End View of the New Buda Bus Engine

Water is circulated by a centrifugal pump having a large bronze runner. Temperature in cylinder is regulated by Sylphon thermostat, bypass being connected to inlet elbow of water pump. Made up as one assembly unit, the water pump and its drive shaft may be readily removed as a unit or separately.

The intake and exhaust manifold are cast separate of grey iron and placed on the valve side of the engine. The exhaust outlet is fitted with an expansion joint.

The valve and valve mechanism is operated by a single camshaft and entirely closed. The cover is split into two sections to facilitate removal and permit adjustment of valve tappets. An opening through the center of the cylinder block permits fitting throttling rod assembly on

either right or left side of engine. The valve push rods are of special steel, mushroom type, and fitted with removable guides.

Pistons are of grey iron and fitted with three concentric rings above the wrist pin and one wiper ring in the lower part of the skirt. Special care is taken in boring and reaming the piston pin holes to insure perfect alignment, size and smooth finish. The special steel, large diameter piston pins are held in position by two positive locks. The first is alloy steel lock screw with two diameters and extending through both sides of the pin to give double shear and prevent improper fitting of the pin at any time. The second is a spring retainer ring which expands in grooves turned in each end of the piston bosses.

Divided horizontally into halves the upper half of the crankcase contains the crankshaft bearings and extends over the flywheel to form the upper half of the bell housing. The lower half of the bell housing is a separate casting and not a part of the crankcase or oil pan. This makes the one-piece oil pan easily removable. The oil pan is divided into an upper and lower compartment by a removable plate, the lower section forming a large oil reservoir. Fitted directly beneath the

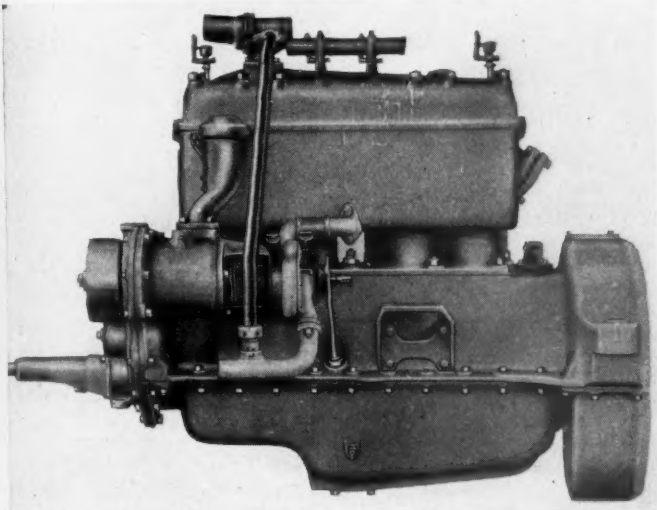
are fitted with phosphor-bronze bushings and lower ends with bronze shell, babbitt lined bearings. The crankshaft is counterbalanced and rotates in three main bearings. It is drop forged from open-hearth steel, heat treated, machined and drilled for force feed oiling system. Drop forged in one piece from open-hearth steel, shaft and cams are integral. A flange is provided to which the timing gear is bolted.

The timing gears have extra wide faces and are cut helical. The gear set is composed of one crank, one cam, one idler and one pump shaft gear, also one generator shaft gear when generator is used, all of which are easily accessible upon removal of gear case cover.

Lubrication is by full force pressure feed to all crankshaft, camshaft and connecting rod bearings.

The fan bracket support is cast integral with the gear case cover and a fan pulley for a belt two inches wide is attached to the pump gear shaft in front of the gear case cover. These engines have fasten-

Left Side of the New Buda, Showing Balanced Disposition of Units



oil pump is a large hand hole through which the pump or the pump screen may be easily removed for inspection or cleaning. The screen is large to prevent clogging.

The gear case cover is arranged with a large trunnion, forming the third support, and to which, also, the starting crank bracket is bolted.

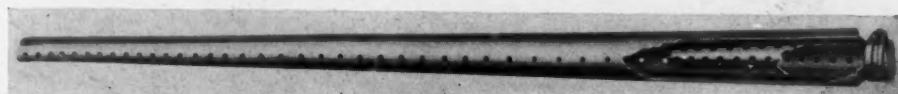
All main and lower connecting rod bearings are bronze shell, babbitt lined. The babbitt lining of this type bearing is exceptionally hard. The camshaft bearings, which are three in number, are of babbitt, die cast. All main bearings are accurately reamed and scraped to a bearing.

The combined breather and oil filler is equipped with two strainer screens and, also, a disk valve at the top, which permits the engine to exhale only.

Connecting rods are drop forged, made of chrome vanadium steel specially heat treated, and have no offset. Upper ends

ings of the three-point suspension type. The rear supporting arms are exceptionally strong and cast integral with the upper half of the crankcase and arranged with main frame support. Forward end of engine is supported at crank center by a large trunnion bracket, arranged to rest upon the drop cross member of the frame.

Provision has been made for attaching starting and lighting equipment; and for ignition by a magneto driven from the end of the water pump shaft or battery ignition by timer, which may be mounted on water pump drive shaft housing. A governor pedestal is mounted behind the rear cylinder and carries a vertical shaft driven by the camshaft.

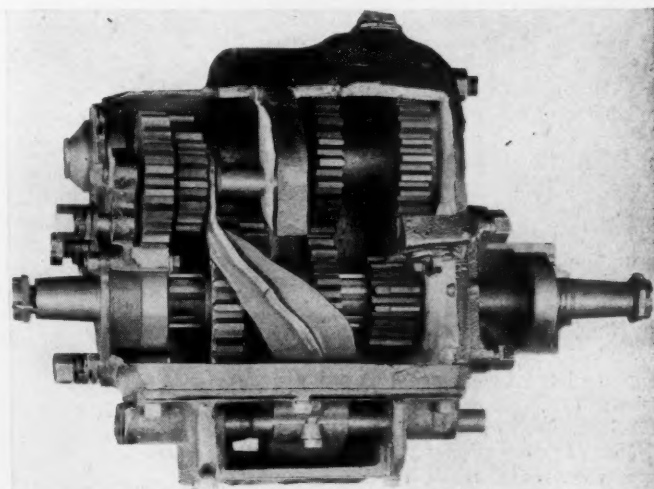


This Muffler is Light in Weight, Simple in Construction and is Claimed to Materially Reduce Back Pressure

Fuller Transmission for Motor Bus

Fuller & Sons Manufacturing Co., Kalamazoo, Mich., in recommending its model G amidship type transmission, HC control set, and GCL multiple disk clutch, states that the sturdy reliability of these units makes them well suited for bus work.

The model G-7 transmission, which has been tried out experimentally on several motor buses, has proven, according to reports, very satisfactory. The design of this transmission has been worked out for easy shifting, which is essential in motor bus service, and for smooth and silent operation. Silent operation is said to have been obtained by the accurate grinding of the main and countershafts and inside gears, making for the true running of gears. This model transmission is manufactured both with direct drive on third speed or fourth speed. Quality angular ball bearings are used on the main shaft and countershaft.



Cutaway Disclosing Mechanism of the Fuller Bus Transmission.

Kemble Truck Muffler a New Departure

A radical departure in muffler design is about to be marketed. It is known in aviation service as the Curtiss type, but has recently been adapted to truck use and is being manufactured by the Powell Pressed Steel Co., Hubbard, Ohio, under license from the Curtiss Engineering Corp., and will be marketed as the "Kemble" Muffler. This muffler is claimed to give a lower back pressure, to weigh less, to be entirely free from clogging troubles and practically indestructible under service conditions.

In its simplest form, this muffler consists of a conical shell with a narrow longitudinal slot, which permits the exhaust gas to escape to the atmosphere as rapidly as the narrowing cross-section of the cone tends to check the velocity and raise the pressure.

As adapted to truck use, a series of circular holes replaces the longitudinal slot, and a short inner cone is added. The muffling effect is obtained by dividing the total outlet opening into a multitude of much smaller openings, which give correspondingly smaller noises, occurring successively, and so by "stringing out" the exhaust, soften it in much the same fashion as by a continuous longitudinal slot.

The low back pressure and immunity from blowing are due to the fact that the total area of the outlet openings in the cone is approximately equal to cross-section of the exhaust pipe.

The inner cone used in truck mufflers checks the velocity of the gas in the outer cone slightly by diverting the direction of flow of the gas, thus increasing the time interval over which the exhaust is strung out in a muffler of given length. This increases the muffling effect without perceptibly increasing the back pressure.

New Spark Plugs and Policy Announced by Bosch

The manufacturing and marketing policy which will govern the production and sale of Bosch spark plugs during 1922 is especially interesting, not only because it includes a price reduction and the bringing out of new types, but because the policy itself is based upon the expressed opinions of prominent automotive jobbers of the country.

The American Bosch Magneto Corp., Springfield, Mass., recently made a careful and thorough investigation to determine just what constituted an ideal spark plug line, and what rules should be followed in its sale and distribution. Questionnaire letters were sent out asking the jobbers to give their opinions. Many were interviewed personally.

Before the questionnaire was sent out, there were only three types of Bosch spark plugs, but it was the opinion of most of those questioned that seven types were needed to meet the requirements of practically all well known engine types. Four new types of spark plugs were promptly designed to conform with this opinion and the line now consists of seven

types of the following sizes: $\frac{7}{8}$ in., standard, with large hex; $\frac{7}{8}$ in., standard, with S. A. E. hex; $\frac{7}{8}$ in., long, with large hex; $\frac{7}{8}$ in., extra long, with large hex; $\frac{7}{8}$ in., long, with S. A. E. hex; $\frac{1}{2}$ in. with pipe thread, and 18 millimeter metric.

It was decided to conform to the opinion of the jobbers and reduce the price of the Bosch spark plug from \$1.25 to \$1.00. The plug is now being marketed at this new price.

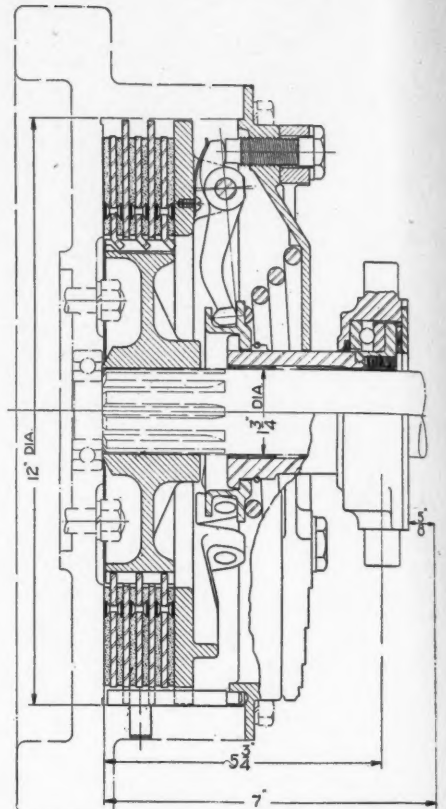
The advice of the jobbers is also being followed with regard to discounts and percentage of profit on sales. Bosch spark plugs are sold to the trade at varying discounts, depending upon the number of plugs ordered at one time, but the minimum percentage of profit to the jobber on maximum quantity sales is approximately 25 per cent.

Merchant & Evans Offer Bus Units

The Merchant & Evans Co., Philadelphia, Pa., according to a recent report, is prepared to offer mechanical devices and automotive units specially applicable to motor bus construction. Among some of the units specially noted and recommended are its dry disk clutches, universal joints, and Hele-Shaw clutch.

The model 12, heavy-duty clutch is especially recommended by the maker to meet the severe requirements of bus service. This clutch is known as the triple dry disk clutch, and is obtainable both in the unit power plant type as well as the open fly-wheel type. The friction surface is said to be 50 per cent greater than in its standard model 12 clutches, and, as the requirements of this type of clutch will permit the use of a more powerful spring, the maximum torque capacity is approximately 17,000 lb. ins. The company also recommends the Hele-Shaw multiple disk oil lubricated clutch for this type of service.

In describing the working requirements of a clutch and the principle of a design



Merchant & Evans Heavy Duty, Open Flywheel Type of Clutch

followed in Merchant & Evans' clutch production, the following statements are made by this concern:

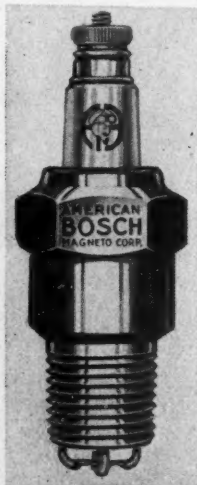
The power of the clutch consists in (1), the number of its driving surfaces; (2), multiplied by the mean diameter of its surfaces; (3), multiplied finally by the spring pressure exerted on these surfaces. The larger the total area of these surfaces, the less the unit surface pressure, work and wear, and the smoother, quieter and more durable the drive.

In view of these facts the company decided when designing its line of clutches that in order to secure smoothness and durability not less than two driving disks must be employed, thus virtually doubling the driving area and having the spring pressure as compared with the single disk type clutch. Minimum amount of clutch is advocated.

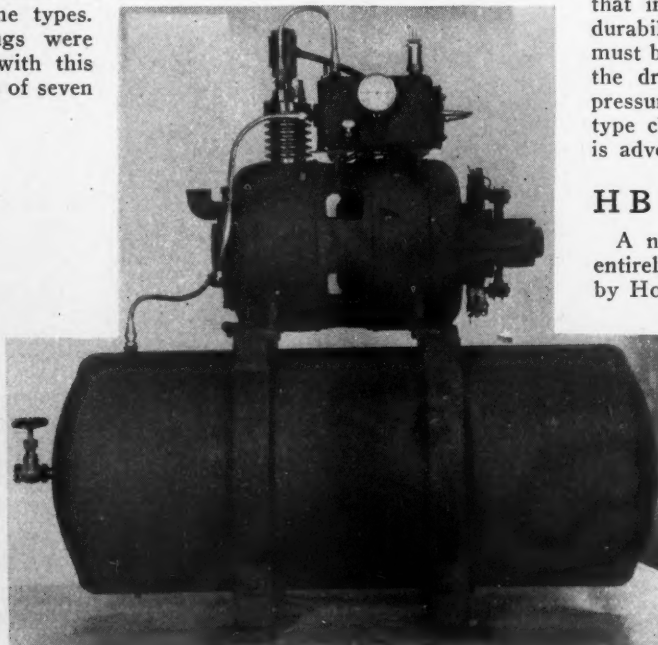
H B Heavy Duty Compressor

A new high pressure air outfit that is entirely automatic has been brought out by Hobart Bros., Troy, Ohio. This equipment is specially adapted to large pneumatic truck and bus tires, and carries a pressure up to as high as 350 lb.

The outfit is ball bearing equipped and furnished in one and two cylinder capacities depending on the volume of air required. The pump is built directly into the motor, which eliminates breaking and slipping belts, and insures economical operation at all times.



One of the Latest Additions to the American Bosch Line of Spark Plugs.



New High-Pressure Automatic Air Outfit Recently Brought Out by Hobart Bros.

It is furnished complete with oil and air filter, automatic switch gage, safety valve, and can be provided with tank mounting, or ready to connect to the present air lines. The makers claim a low selling price that is made possible by economical single unit construction.

Atlas Rear Axle for Motor Buses

That the evolution of the motor bus in this country means the abandonment of the conventional truck chassis mounting a bus body, in favor of an entirely new design incorporating a larger and more powerful motor to obtain additional speed and flexibility; a wider frame and longer wheelbase for stability; and a lower center of gravity to complete the ensemble; is the conviction of the American Machine Co., manufacturers of the Atlas axle, and has encouraged them to bring out a special model to meet these specific requirements.

The Atlas motor bus rear axle, although not an adaptation or a compromise, follows closely the design of the standard axle, perfected during the past three years, with the main difference that the cast, box girder, load carrying member is mounted in an inverted position, thus affording a spring pad height of only 14½ in., with 36 in. solid tires, in the Model LC8.

If it is agreed that modern motor bus design should provide a low frame both for stability and the convenience of the passengers in entering and leaving the vehicle, this axle seems to permit an ideal condition in this respect. The extremely low spring seats make possible a frame height of 24 in., loaded position, without kicking up the frame or underslinging the springs. Even so, a ground clearance of 7 in. remains at the differential and there is ample floor clearance above.

The salient features of Atlas standard design are retained, including the enclosure of all moving parts; the oil lubrication of all gears and bearings, and the double internal expanding brakes, also enclosed but readily accessible for adjustment. The brakes, an important adjunct in this class of service, are 21 in. in diam., toggle operated, and claimed to be very effective.

This Model LC8 axle, now going into production with increased manufacturing facilities at a new location, is suitable for the average 30-passenger motor bus, being rated at 8000 lb. maximum on spring pads and having a torque capacity as high as 2200 in. lb. The tread is 72 in., with 50 in. maximum spring centers, using 3 in. springs, and the final gear reduction is 7½ to 1. Weight of this axle, complete with hubs but without wheels, is 760 lb. The wheels, of cast steel, are essentially part of the axle and are furnished with it. The hub caps, cast integral, are provided with a 1 in. threaded and plugged hole. Removal of the plug and the insertion of a standard 1 in. bolt or cap screw, results in a simple wheel puller and very easy removal of the wheel. No bearings are displaced and the oil lubrication of the internal gears is not lost when the wheel is dismounted to reline the brakes or change tires.

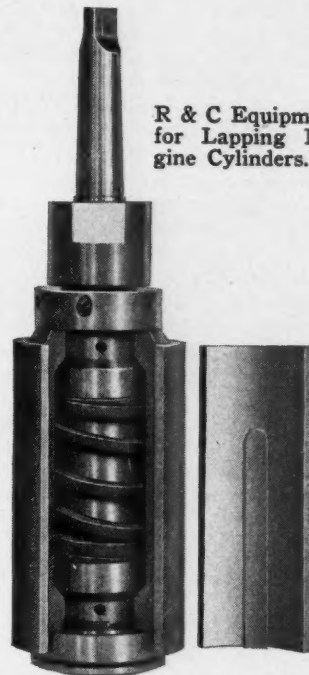
The American Machine Co., motor truck axle division of the Loddell Car Wheel Co., is located at Wilmington, Del.

R & C Lapping Tools

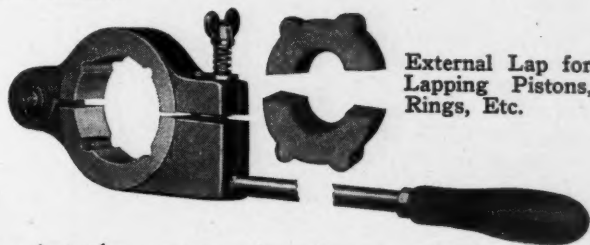
The R & C Lap Co., Davenport, Iowa, recently developed a line of tools for lapping new engines, thereby rendering the "breaking-in" of engines unnecessary. The lapping process is claimed to impart to the surfaces of the cylinders, pistons and rings a smooth finish that is claimed to retain accurate dimensions much longer than would be possible if finished by the common practice, "breaking-in"; or any other way. Compression leaks and consequent loss of power is stated to be reduced to a minimum.

The construction of the R & C standard lap is simple and sturdy. One section, or shell, has been removed in the accompanying illustration, to show the construction. This lap consists of a shank of the floating type, and an expanding device for adjusting the size, and also for taking up the wear of the soft metal shells which are charged with the abrasive. These shells are made in different

thicknesses, and are interchangeable, making possible a large range of diameters. The floating shank renders perfect alignment with the hole unnecessary. The lap is used in a drill press or with a portable



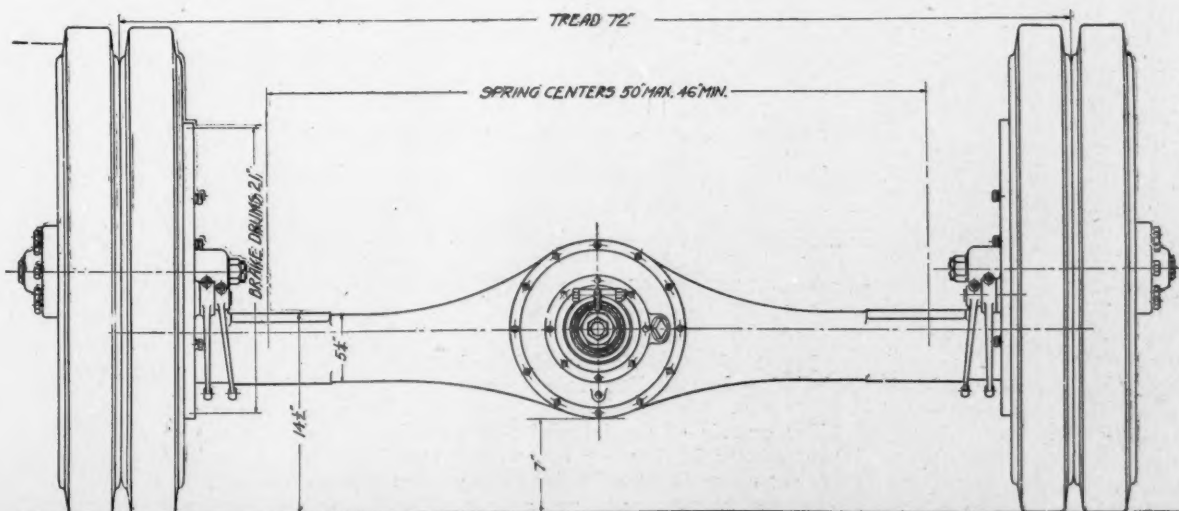
R & C Equipment for Lapping Engine Cylinders.



External Lap for Lapping Pistons, Rings, Etc.

motor. Operation in either case is simple and easy.

The Special lap, also illustrated herewith, is used to lap closed head motors from below without removing from the frame, or for removing slight scores in the engines after runs on the test block without removing head.



Note the Tread and Spring Centers of this New Atlas Motor Bus Axle

The Britton Motor Bus Axle

THE Britton Axle Company of Saginaw, Mich., will soon be in production on two sizes of axles which are designed especially for use on passenger buses. These bus axles will be produced in connection with their line of standard truck axles.

These axles are of the internal gear drive type, with wide tread and with the jackshaft placed directly under the wheel spindles and inside the hollow, rectangular load-carrying member. This construction is particularly suitable for passenger buses, and because it enables floor of bus to be placed several inches closer to the ground than with any other type of axle.

The Britton bus axle is made in two sizes: the Model 20, which is suitable for buses of 15 to 20-passenger capacity, and the Model 30, which is suitable for buses of 25 to 30-passenger capacity. The latter has a spring pad capacity of 8000 lb.

It will be noted from Fig. 1, which is a vertical section of the Model 30 bus axle, that the top of the differential case is but 18 1/16 in. above the ground when using 34 in. tires, and that the top of spring pads which do not require the use of spring chairs, are 1 1/8 in. below the center of the wheel spindles. The ground clearance under differential is 7 7/16 in.

Differential and Jackshafts

The method of mounting the differential and jackshafts is plainly shown in Figs. 1 and 2.

The differential is carried on the extended ends of the jackshaft housings, the cone of the differential taper roller bearing being mounted on the end of the jackshaft housing and the cup of the bearing pressed into the differential case. The side adjustment of the differential is obtained by means of slotted and threaded collars on the extended ends of the jackshaft housings. Each collar is held in adjustment by means of a pin extending from the differential case cover into the slotted portion of the adjusting collar. When the cover is removed these collars are unlocked and the cover cannot be re-

placed without again locking these adjusting collars. This feature is an example of the principle on which the entire axle has been designed. No effort has been spared to make every detail of the axle thoroughly accessible, fool-proof and simple in construction.

An integral collar on the jackshaft housing is lightly pressed into a bored opening in the side of the differential case, and the outer end of the jackshaft housing, which contains the jackshaft pinion bearing, has its outer turned portion fitted into a bored opening in the outer end of the carrying member.

In order to remove the differential it is only necessary, after removing the differential case cover and wheels, to remove the nuts from the two bolts at the ends of the jackshaft housings, when the jackshafts and housings may be slightly withdrawn, thus permitting the differential to be lifted out.

Spiral Bevel Gears

Both the bevel ring gear and the bevel pinion are made of 3 1/2 per cent nickel, and the teeth only are carbonized. These gears are cut with a 30 degree lead angle, and with a 1 1/4 in. face which gives a very liberal overlap of the spiral teeth and assures quiet operation. The use of 3 1/2 per cent nickel steel bolts instead of rivets for fastening the bevel ring gear to differential flange greatly facilitates the changing of these gears and does not require the employment of skilled workmen or the use of special equipment. The side thrust of the ring gear is taken by the differential flange and not by the bolts.

Lubrication

One of the special features of the Britton line of axle is the ability to retain a large quantity of very thin and fluid differential grease in the internal gear cases. Three pints of thin differential grease, which pours like oil, has been retained in each internal gear case for long periods of time without leakage. This is accomplished in the following manner:

lightly against the ground and polished taper of the internal gear. Long periods of use have failed to show any wear of this packing or any leakage of lubricant.

The jackshaft bearings are lubricated from the internal gear case. The action of the gears in squeezing the grease from between the teeth keeps this bearing thoroughly filled with grease.

The wheel bearings are lubricated by the grease in the internal gear case. However, an opening is provided in the hub cup, tapped with a 1/8 in. pipe tap, in which an Alemite connection may be installed. The camshaft for emergency brake is provided at each end with a heavy graphite bronze bushing and requires no additional lubricant.

In order to assure the thorough lubrication of the pinion shaft bearings, large openings are provided in the entire lower half of the pinion shaft housing, through which a steady stream of oil is thrown from the bevel ring gear. There are no openings in the lower half of this housing and the oil must return to the differential case through the rear pinion shaft bearing. Construction is plainly shown in Fig. 2.

In addition to the internal gear packing, a similar packing is pressed into a machined recess in the outside edge of the brake anchor plate. This packing presses against the inside of the brake drum and prevents mud, sand, or ice from collecting in the brake compartment.

Gear Reductions

Although the central differential case is very small in diameter, the design of this case is such as to permit of great latitude in the gear reductions which may be employed.

The spiral bevel ring gear is 4-pitch with 1 1/4 in. face, and contains 37 teeth. The bevel pinion may be any size from 13 to 22 teeth.

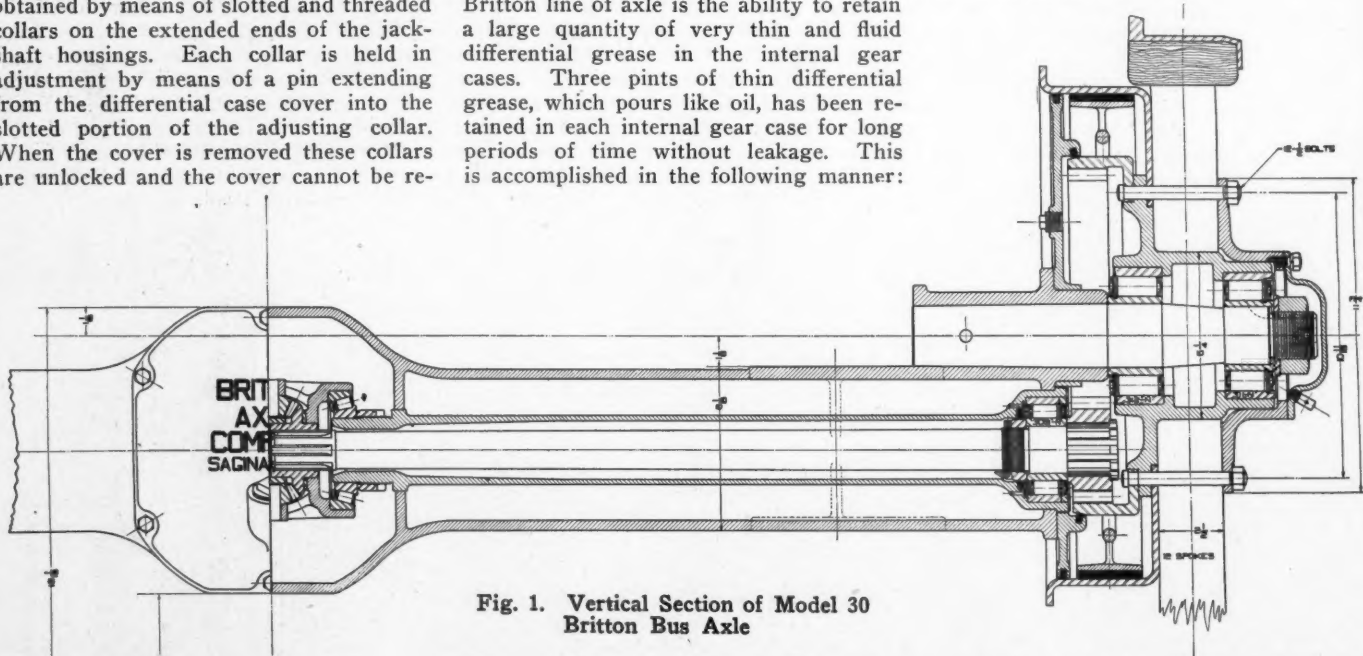


Fig. 1. Vertical Section of Model 30 Britton Bus Axle

The outside of the internal ring gear is turned to a 10 degree taper and that taper is ground and polished in order to prevent wear of the lubricant retaining packing. This packing is pressed into a machined recess in the anchor plate and rests

The internal ring gear is 4/5-pitch with 1 1/2 in. face, and contains 48 teeth. The pinion contains 14 teeth.

It will be noted from the above that the total gear reduction of the axle may be from 5.77 to 1, to 9.76 to 1, without

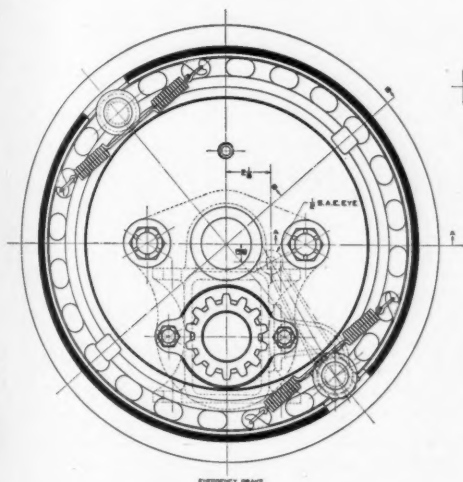
changing the size of the spiral bevel ring gear. The central differential case, which is integral with the carrying member, is but 10 5/8 in. outside diameter.

The tread of the Model 30 bus axle is 70 in. This wide tread gives the bus great stability, and is a feature which is being demanded by well informed bus operators. The tread of the Model 25 truck axle is 58 in.

Brakes

The Model 30 bus axle is furnished with emergency brakes only. This is done for the reason that most of the manufacturers of passenger buses have found it necessary to design special service brakes for installation at the center joint of the two-piece propeller shaft. These brakes are designed so as to permit the quick replacement of the service brake linings.

Fig. 3 shows the construction of the internal expanding shoe type of emergency brake used on Britton bus and truck axles. The two brake shoes are cast in one piece, then machined on the outside to assure concentricity, the cam surfaces milled, action pin holes drilled, and then cut in two.



The truss construction of these brake shoes makes them extremely rigid and prevents distortion due to the action of the brake cam. It also prevents the brake shoes from becoming distorted when riveting on new brake linings.

It will be noted that the emergency brake drum is provided with a large stiffening flange in order to keep the drum truly concentric. The inside bore of the brake drum is piloted on a turned portion of the hub and the drum is secured to the hub by means of the twelve 1/2 in. alloy steel bolts which hold the internal gear and wheel to the hub.

The outside diameter of the brake drum in both the Model 30 bus axle and the Model 25 truck axle, is such that the drum readily goes inside the felloe of a standard wheel for pneumatic tires, thus permitting the wheel spokes to be placed central with the felloe. This construction is shown in Fig. 1.

A standard, universal, service brake is provided with the Britton truck axles, which may be mounted either on the axle at the bevel pinion shaft, or mounted on

a cross-member at the center joint of the two-piece propeller shaft.

Number of Parts

The design of these bus axles has been so thoroughly simplified and the parts standardized to such an extent that these axles contain the absolute minimum number of manufactured parts, and also the minimum number of standard parts, such as bolts, washers, nuts, cotter pins, and brake band rivets.

The definite figures giving the number of both manufactured parts and standard parts in the Model 30 bus axle are given below:

Kinds of manufactured parts....	55
Total manufactured parts.....	137
Kinds standard parts	33
Total standard parts	242
Grand total parts	379

Beside reducing the cost of production, it also reduces the cost of parts stocks required by both manufacturer and service station, and results in a very material saving to the vehicle user.

The standard line of Britton truck axles contain no right and left-hand parts whatever. In the design of the bus axles, however, it was found necessary to make the brake anchor plate right and left-hand in order to place the brake cam-shaft and lever at the proper low position on the axle. All other parts of the bus axle are readily interchangeable from one side to the other.

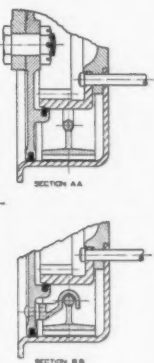


Fig. 3. Brake Construction

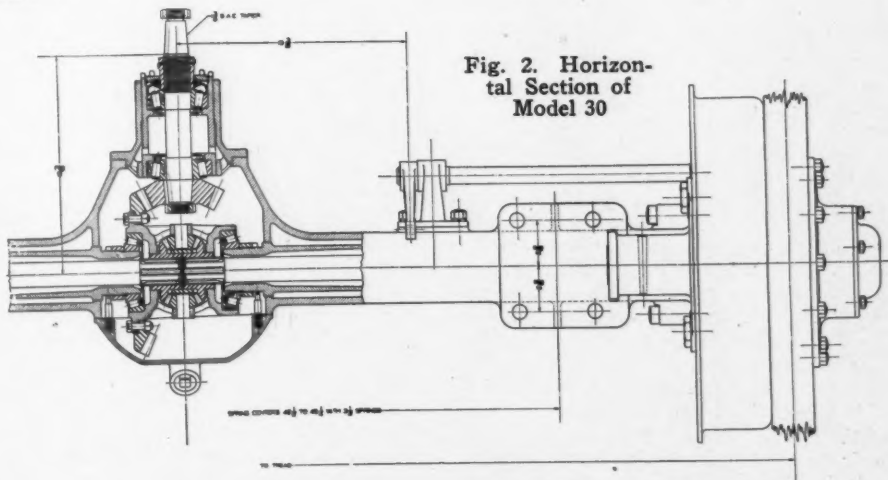


Fig. 2. Horizontal Section of Model 30

It would be noted from Figs. 1 and 2 that the central differential case is an integral carrying member. This feature together with the high section modulus of the hollow rectangular section of the carrying member, and other details of design result in a minimum weight for the entire axle. The bus axle compares very favorably in weight with other axles of equal carrying capacity, tread, width, and spring centers.

Extreme Rigidity

The rectangular, hollow, member is cast integral with the central differential case, thus insuring extreme rigidity and strength and also requires the use of the minimum number of parts. This design also gives the maximum strength for resisting torsional strains due to twisting of the frame, and requires that the distortion of the frame be compensated for by the action of the springs, the same as in worm-drive axles.

All parts used in the construction of the bus axle are made with the same machine tools, jigs, tools and fixtures which are used in the production of the truck axles. There are six kinds of parts, or a total of eleven parts in the bus axle which are different from the truck axle parts.

One of the most important features of both the bus axles and the truck axles is the ease with which the entire axle may be disassembled or any part removed and replaced, thus reducing the cost of assembly by the axle manufacturer.

The Britton truck axles with the exception of six kinds of parts are constructed of the same parts as used in the bus axles.

In the truck axles the jackshaft and carrying member, instead of being under the wheel spindles, are located with their centers level with the centers of the wheel spindles.

The Model 25 truck axle which is made of the same parts as the model 30 bus axle has a ground clearance of 12 11/16 in. under the differential case when using 34 in. tires. The tread of the Model 25 truck axle is 58 in.

The Britton Axle Company was incorporated under the laws of Delaware in July, 1921. It has an authorized capital stock of \$500,000 in preferred stock and 30,000 shares of no-par common stock.

This company was organized by Major Wm. M. Britton, the designer of the axles, who, it will be remembered, was in charge of the design of the Class B standard war truck, and who was for many years in charge of all engineering and service connected with motor transportation for the quartermasters' corps of the War Department.

(For additional Bus Equipment see pages 72, 73, 76)



SERVICE AND REPAIR DEPARTMENTS



Are Service Stations Getting the Big Idea?

Service Association Development of the Past Year Favorable Indication of Greater Co-operative Effort Along the Lines of Better Service

Industry's Stability Rests on Service

Ten Service Commandments for the Success of Service Stations

By C. P. SHATTUCK

JUST what have the various service associations accomplished during the year just closed? Have they made progress or are they marking time? At the time of writing there are about eighteen service organizations, composed of the service managers of passenger car and truck dealers and distributors, to the knowledge of the writer. With these must also be included the Factory Service Managers' Association.

According to Harry Cobleigh, in charge of the service department of the N. A. C., the year just completed has shown considerable progress and accomplishment among the majority of the dealer associations. He finds them more responsive to suggestions and when one can prevail upon the secretary of an association to keep up his correspondence, and his association before the public, it is an infallible rule that the organization is progressing.

It is satisfying to note that a number of the associations are active in increasing their membership and New York is noticeable in this respect. A number of the younger associations have succeeded in overcoming some of the difficulties always present in a new organization and are making progress. In some instances the function of a service association has taken on the aspect of a branch of the dealer association.

Problems to be Solved

A canvass of the associations shows that they have two problems. One is that of getting the members to turn out 100

per cent strong at the meetings, and the other is providing an attractive program. **A large attendance, however, does not necessarily mean accomplishment.** There is in the East a service association, the meetings of which are not heavily attended but this organization has a record for doing things. When an idea is germinated there is action, plenty of it, and quick action. The association referred to put over a newspaper advertising campaign to educate the public to the meaning of the service association, to stimulate winter business, and put it over quickly and successfully. Another big association did not put over a similar campaign because, it is alleged that the prospects could not be sold the idea. At least they were not sold. So it must be deducted that big attendance does not always mean real results.

Why the Attendance is Small

Why do not all the members attend the meetings? One would imagine that a service manager should be interested in his bread and butter, and bettering service has a direct bearing on his meal ticket. A number of service men join an association because they were "influenced." They do not join with the idea of putting their shoulder to the wheel or ever giving the association their moral support, viz., showing up at the meetings. Some of this class will be on hand if the announcement states there will be plenty of jazz music, pretty girls and eats. This is the kind that is ever present in any organization.

Then there is the type who joins because he is coaxed or is solicited. He kicks in a few dollars but stops there. Such types are not good members and unless they can be shown that only an active member is of any use to an association, **any and all associations had better do without the dollars obtained under guise of dues.**

The writer has talked with a number of service men, members of various organizations, asking them what would appeal to them in the meeting programs. Invariably the answer is **someone who really knows the unit, part or equipment** and who can talk in terms the service men will understand. The statement of an Eastern service man, and a live and active chap at that, may be used to express the sentiment of a number. "I get an announcement," he said, "that for the next meeting the great event will be Willie Wrinkles, of the Best Ever factory, and that he will give a real, honest to God talk on his stuff. What does he pull? Why, he tells us what a great concern he is tied up with, what fine stuff they make, etc., but never a peep about what we want to know. And if we call his hand the chairman will break in and chide us because we are so unkind to the poor man who has traveled from Detroit in a Pullman and who is darned glad to get a day off from his troubles."

Why Engineers Fail to Interest

Said another service man in the truck field: "If they want to get us around to the meetings why doesn't the committee arrange to get the head mechanic from

the factory and have him bring his stuff, special tools, etc., and give us some inside stuff on how we can tear down a job and rebuild faster and better than we think we can do it? What we want is fellows of our own kind, a chap who will answer questions and show us. We don't want the engineers, for these birds never make any mistakes and if you crowd them about their design they will either take refuge behind a formula or a slide rule and stand on their dignity. And it is a good bet that some of the engineers could pick up a few points from us chaps who have to handle their stuff. I'd like to have a couple I know of working in my shop and and see how they would handle some of their own stuff. I'll bet they would re-design some of it."

Many similar expressions have been made but after all where does it get us? But this much may be determined and that is that there is need of more real service features at the meetings and less of the advertising and social stuff. Of course some who read this will say that the smart Alec who wrote this article might get out and show us how to run some meetings. Anticipating the challenge, the writer craves the indulgence of his service readers to expound some of his ideas which are based on observation and discussions with members of various associations.

The Ten Service Commandments

First—The successful association must be headed by men who have a strong personality, executive ability and a complete knowledge of service from A to Z.

Second—There must be a real, active, hard working secretary, not one who is thrown into the job because he is a good penman, or is willing to be the goat. The secretary or manager, or executive secretary, call him anything you wish, is about 60 or 70 per cent of the whole works. If he is not on the job, if he handles it like a mail order business, then "good night" to progress. Pay the secretary a salary, if necessary. A new association cannot afford any great stipends but it can pay something and increase wages with production. A real secretary will keep in touch with all matters, all the efforts of other associations and should see that the newspapers and trade papers receive reports of the activities and plans of the association. Publicity of the good work the service associations are trying to do is vital. If the associations could start a national advertising campaign they might be able to obtain more support from the manufacturers and the dealers, too many of whom do not hear enough about the good work the service men are doing and trying to accomplish. And there are many who still view the association idea as a new toy and not one that will endure. I'll gamble if one were to write every association in the country for information he would obtain about 40 per cent results. For specific data on this phase of the subject ask Harry Cobleigh.

Third—Secure a real service committee, not merely appoint one. A service committee—do not confound this with an entertainment committee—should if it studies conditions, service, etc., be able to map out a series of real service meetings

somewhat along the lines suggested by the previous remarks on what was desired. Perhaps a committee with pep, punch and vim might be able to arrange some real demonstrations of service work, have the demonstrators show how they cut operations and improved methods. It is surprising the lack of knowledge mechanics have of certain units and their component parts. Perhaps the committee could secure some of the factory service traveling men, chaps who really know good work when they see it, to appear and describe and illustrate the improved methods in shops employing from a few to a large number of men. Perhaps these speakers would be able to throw light on a number of small problems which are daily occurring in various shops. Probably these traveling men might be able to outline how good mechanics were developed, how ambition was instilled in the "grease hound." Also they might be able to show or explain some of the ingenious methods developed by the mechanics in the small places. Was it not a factory service manager who said at the recent convention that he found the best mechanics—and workmen—in the rural places?

And it might be that the committee by working with committees of other associations, particularly those within the same traveling zone, would be able to secure some real factory service talkers, not the Willie Wrinkles type. And it may be far fetched, but what is the matter with bringing out the mechanics some night when you have a speaker who has risen from the ranks and who might be able to put some ambition in the hearts of the mechanics?

Help the Poor Mechanic

Next, what has been accomplished in developing mechanics? The old school is dying out fast and an increasing number of new men are needed. Where are we to secure them? We have too many of the type that are 100 per cent (in their minds) r. . . If you have a boy growing up, Mr. Service Member, would you advise him to enter a repair shop? You answer that question and you will have found an answer to the why the shortage of real mechanics. This may please Ralph Rognon, but after all shouldn't a repairman have some future to shoot at except dirt and grease and limited pay? It is the belief of the writer that a service association can do much in solving the mechanic problem.

Fourth, and it is the most essential factor, sell the dealers, your employers, the merits of your association. Courtesy will prompt a few to accept invitations, but if you can arrange a pocketbook appeal they will swallow hook, line and sinker. The average dealer does not like to think about his repair department (he associates it with thoughts of kicking customers and complaining salesmen), so if you wish to hit the bull's eye you must show him that you are working for his profits, satisfied customers and more sales with less sales resistance. He is going to be a tough bird to sell but he can be sold when you show him something concrete.

Fifth—Hold a kicker's or complaint meeting. Get out all those birds who grumble but really say nothing, and those who pay dues but do not attend, and make them come through with suggestions, criticisms. Have a real, old fashioned straight from the shoulder talk and find out what they want, and if reasonable, give it to them. Some of the weak sisters will probably get peeved but if they do not work for the association get along without their dues—and without them.

Sixth—When possible and practical visit the nearby association and arrange a joint meeting or be the guests of the other association. This will promote healthy competition, for the receiving association will naturally get on its toes to show the visitors it is a live wire.

Seventh—Organize the secretaries of all associations into a national publicity department, i. e., have a condensed report of real accomplishments compiled and send same to the manufacturers to show them that the associations are really working for the makers and the public. Get the newspapers to publish high spots and better still, see if you cannot get some live newspaper man to run a Sunday special on what the association stands for with the strong human interest appeal, so that the public will know you are on the map. If any of the New York papers have ever given service a boost I have failed to see it. It is very probable that they could be interested if the goods were properly labelled.

Organize Publicity Campaign

Eighth—See that every trade paper has something about your meetings and the dates. Every trade paper of note will publish news and plans of associations and I believe that all leading papers have gone out of their way to aid the service associations. If secretaries will kindly bear in mind that it is not practical to send representatives to all meetings, they might realize why mention is not always made of meetings, etc. The CHILTON publications, the AUTOMOBILE TRADE JOURNAL, the COMMERCIAL CAR JOURNAL and the TRACTOR JOURNAL, will cheerfully co-operate with the secretaries, but they must also co-operate.

Ninth—Harry Cobleigh, Service Department, N. A. C. C., 366 Madison Ave., New York City, is in a position to extend aid to all associations through the contact of the N. A. C. C., with the manufacturers. Mr. Cobleigh can be of valuable assistance to new associations as well as old, and to those contemplating forming an association. Drop him a line.

Tenth—To every member of a service association the writer desires to leave this thought and it is that the success of the association, and your success, depends wholly upon your being an active worker.

Will the service association movement grow and will the industry give it the recognition it deserves? The writer thinks the correct answer to both questions is YES, for as Norval Hawkins put it at the factory service managers' convention, "Cars and trucks will be sold from the back door, service, and not from the front." When Hawkins said that, he said a lot about service in a few words.

Discussion of Stromberg Carburetor Performance and Recommended Disassembling, Cleaning and Adjusting Procedure

By C. P. SHATTUCK

THE following are the factory methods for disassembling, cleaning and adjusting the Stromberg Type M carburetors, made by the Stromberg Motor Devices Company, Chicago. The directions given herein are those that may be followed by the truck dealer's mechanic, and do not include all work performed at the factory, its branches or service stations. The Stromberg carburetors are serviced by factory branches in New York, Chicago, Boston, Detroit, Portland, Ore., Los Angeles and San Francisco, and by approximately 700 service stations. These branches, and many of the service stations, have factory trained men whose duties are to render efficient service to the clients of the truck dealer, and to instruct dealer's mechanics in the adjustment, care and maintenance of the carburetor. A certain amount of free service is rendered, it including checking up performance and making adjustments to meet the requirements of cold and hot weather.

Why a Carburetor Service

While the average mechanic may clean and adjust the carburetor to obtain satisfactory results, instruction sheets being provided, the writer contends that a practical knowledge of how the carburetor functions and how its component parts operate, is an advantage, in that it will enable the mechanic to more readily complete the work, as well as enable him to explain to the truck driver how to obtain better results. The average truck driver is not concerned as to how much or little fuel is consumed because he does not pay the bills. But the truck dealer should be interested in the mileage per gallon obtained, for business men are scrutinizing cost sheets closely these days and the writer hazards the opinion

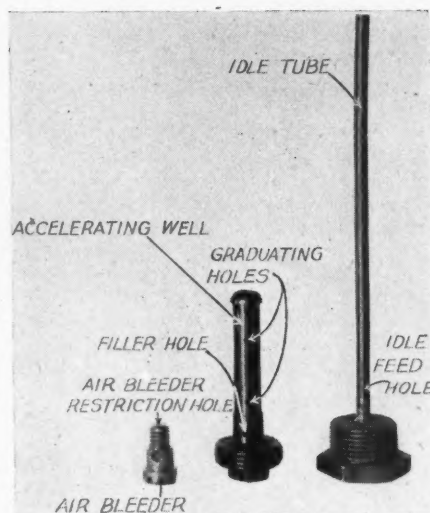


Fig. F: Arranged From Left to Right, Are the Air Bleeder, Single Compensating Well and Idle Tube

that even the variable costs in truck operation will be the deciding factor in sales in the buyers' market. The truck dealer with an eye to small details will find it to his advantage to educate and sell the driver on the importance of ob-

taining the maximum efficiency from his carburetor.

How the Carburetor Functions

The truck type of Stromberg carburetors are known as Type M and MB, the former being the vertical and the latter horizontal. Both are of the plain tube type and have air and fuel openings that are fixed in size; that is, the proportions of air and gasoline are metered automatically without the aid of moving parts, by the suction of air velocity past the fixed jets. Use is made of a compound venturi tube to obtain a high air velocity at the jet. The compound venturi is obtained by placing a small venturi within a large one. The large venturi is shown in the illustration D.

Proportioning the air throughout the operating range is accomplished by the air bleeder jet (see illustrations B and F) that introduces a small amount of air into the gasoline passage before it sprays out into the main air passage. The introduction of this air breaks up the fuel and so controls the flow of fuel that it responds to the engine suction and in proportion to the air flow. The fuel flows from the float chamber past the high speed needle and rises through a vertical channel. Air, taken through the air

Fig. B: Other Side of Carburetor, Showing Location of High Speed Needle Valve.

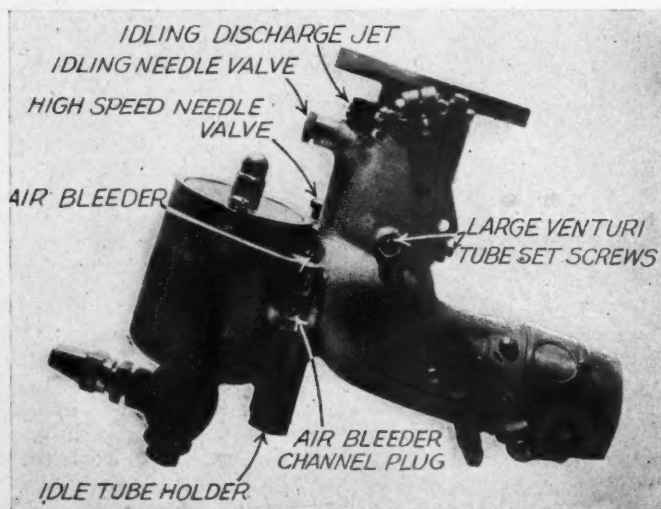
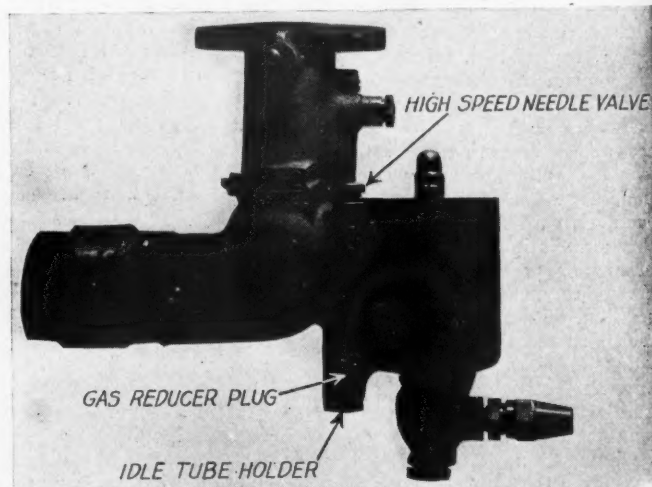


Fig. A: The Stromberg, Type M, Carburetor, With the Adjusting Members and Components Lettered.

bleeder jet, discharges into the fuel channel through fine holes, breaking up the fuel and producing a finely divided emulsion that passes through a number of jets into the stream of air passing through the small venturi tube. This action takes place as the throttle is partially opened. This action should not be confounded with that which occurs at idling speed.

The Idling Tube

With throttle closed and the engine running at "idle" no fuel passes through

the jets in the small venturi tube. With the throttle valve closed the fuel flows from the float chamber past the high speed needle valve to a chamber or well in which is located a vertical tube. (See illustration F.) This tube (Idling Tube) extends through the accelerating well, also shown at F. An opening at the

bottom of the tube permits the fuel to enter the tube when the throttle is closed. Due to the vacuum that exists above the throttle the fuel is drawn into the idling tube and up to an idling jet above the throttle where it is atomized and discharged above the throttle. Air for breaking up the fuel is drawn in through an aperture in the large venturi tube. (See illustration D.) At right angles and directly opposite the air passage in the venturi is a needle valve or screw and this is the low-speed adjustment. It controls the air, and not the fuel.

Function of Well

To supply sufficient fuel to meet the demands of the engine, when the throttle is opened quickly, a temporary enrichment of the mixture is necessary and this is obtained from the reserve supply of fuel in an accelerating well. With the engine idling or slowing down this well fills automatically with gasoline. When venturi suction is increased (throttle opened) the level in the well falls, the fuel passing out through the larger holes in the well (See illustration F), joining the supply or flow from the float chamber, practically doubling the amount of fuel. Thus it will be seen that with the throttle closed (engine idling) the fuel supply is through the idling tube, that with a partially open throttle the small venturi tube comes into action and augments the supply. At wide open throttle the idling tube is inactive, the supply being through the small and large venturi tube jets. Explanation is made of the functioning of the components to show why certain parts should be kept free from dirt and other foreign elements. It is obvious that with the throttle valve adjusted or installed so that it is above the idling jet that the jet will not function because sufficient suction will not be exerted on it. Reference to this will be made later.

The exterior of the carburetor should

be cleaned at least every 90 days, and under some conditions of service each month. This may not require removing the carburetor. Assuming that the carburetor has been neglected for some time and is suspected of not functioning properly, proceed as follows: **Shut off fuel supply at tank, disconnect fuel line (gasoline**

float needle as a unit. Unscrew and remove float needle valve cap. (See illustration E.) This cap has an aperture which should be cleaned and always kept free from dirt. If clogged, the float will not function correctly. **Lift out float,** which is an air tight metal cylinder. Clean all parts in gasoline and wipe dry.

There is an aperture in the main body of carburetor, and this should be cleaned.

To remove and clean the idling tube and accelerating well proceed as follows: Unscrew or back out idling tube holder hex head. (See illustration A.) The tube removed is shown at F and has a fibre washer. Wash in gasoline and see that holes and passage are clear. To remove accelerating well, which is threaded into main body of carburetor, and surrounds idling tube, insert screw driver and back out well. It has small and large holes and these should be cleaned and the part washed in gasoline.

To remove air bleeder (See illustration F) use screw driver and back out. It has holes and these should be cleaned and the part washed in gasoline. Back out and remove idling discharge jet (See illustration A), and use a fine wire or needle to clean the jet passage. Remove the idle adjustment needle, wash in gasoline, and clean the passage communicating with the aperture in the small venturi tube. Back out and remove the high speed adjust-bleeder (See illustration B) in the air bleeder channel plug. Back out and remove air bleeder channel plug.

Cleaning Fuel Passages

The carburetor is now practically disassembled. It is suggested that compressed air be employed to clean the various passages, such as the high speed needle valve seat, the air bleeder passage, idle discharge jet, small venturi tube jets, the air passage in large venturi to idle channel, etc. It is advisable to immerse the body of the carburetor in gasoline and wash thoroughly. There is no need of displacing the large venturi tube or removing the smaller member. No directions are necessary for reassembling the parts. The carburetor will, however, have to be adjusted after replacing on engine. All adjustments should be made with engine warm.

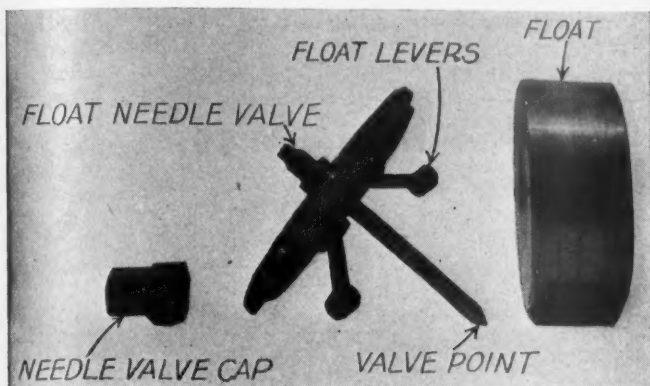


Fig. E: Showing the Order of Disassembly of the Float Chamber Components.

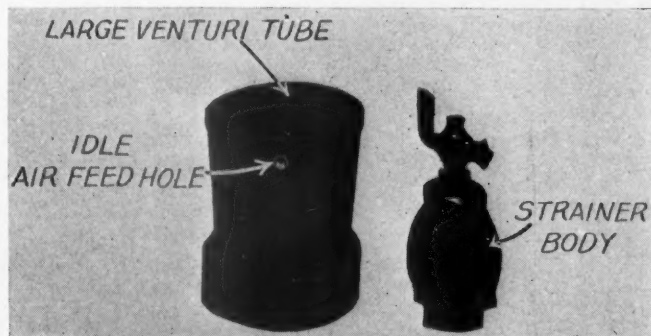
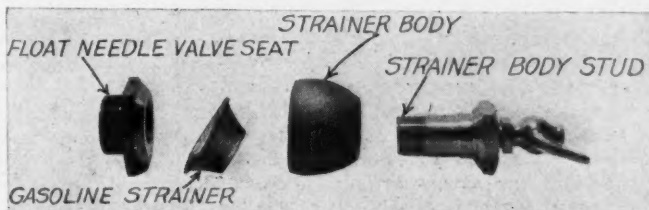


Fig. D: The Large Venturi Tube With Air Passage to Idle Channel, and the Complete Assembly of Strainer and Needle Valve Seat

strainer body stud with strainer body and strainer. Unscrew and remove float needle valve seat. These components assembled, but displaced as a unit, are shown in illustration D. Wash these parts in gasoline or kerosene and dry.

Fig. C: From Left to Right: The Float Needle Valve Seat, Strainer, Strainer Body and Strainer Body Stud, in Order of Removal



See that gasoline passage in strainer body stud is clear and that screen is not torn. If screen is damaged replace with new one.

The Float Assembly

To disassemble float assembly remove float chamber cover screws and washers (2) and lift out cover with levers and

Idling or Low Speed Adjustment

To adjust for idling or low speed, fully retard spark lever and screw in idling adjusting screw until it seats, then turn back. Screwing in obtains a richer mixture (more gasoline) and out a leaner mixture (more air). Turn screw out-

ward until engine slows down and then turn in a notch at a time until proper mixture is secured. When idling properly there should be a steady hiss or suction of the carburetor. If the hiss is erratic it indicates lack of compression on one or more cylinders, leaks at the intake manifold, etc. These conditions cannot be corrected by adjustment of carburetor. If after adjusting for idle speed the engine turns over too fast, back out or turn the throttle stop screw to the left or anti-clockwise until the desired speed is obtained. To increase speed turn screw in or to the right.

High Speed Adjustment

To adjust for high speed advance spark lever to the normal running position and the throttle about one-quarter open. Turn high speed adjustment screw to the left or anti-clockwise to supply more fuel and to the right to decrease the amount. Adjust to the best running position, but **make adjustments, idle and high, with engine warm.** The proper adjustment is determined by experimentation.

If the engine fails to accelerate it may be that either or both the accelerator well and air bleeder are clogged. Failure of the engine to idle is possible if the throttle valve is above the idling jet. This should not be confounded with mechanical or engine trouble. No change should be made in the adjustment of the carburetor until it has been definitely ascertained that the ignition and engine are not at fault. Dirty spark plugs and too large a spark gap are ignition troubles frequently confounded with carburetion. Intake joints not properly sealed, poor compression, improperly adjusted or dirty contact points of the magneto or breaker mechanism (battery type), etc., are among the faults too often credited to the carburetor.

The presence of moisture on the exterior of the carburetor is not an indication of flooding or improper operation of the float needle valve. The present grade of fuel contains more or less kerosene elements which creep up the walls of the carburetor and spread over the outside surface. This condition is particularly noticeable in cold weather. A few drops

of fuel after stopping the engine do not indicate flooding, but the presence of the heavier fuel particles in the intake pipe from whence they drain.

If the carburetor really floods, test the action of the float levers. Remove needle valve cap and tap gently on float needle. This will seat the needle. This should be done, of course, with float chamber empty. Checking and adjusting the lever of the float is a service station job.

Inasmuch as the proper size accelerating well and air bleeder is determined by tests on the engine at the factory of the truck maker, no change should be made by the dealer. If it is believed that a large or smaller unit will give better results the service station of the Stromberg Motor Devices Company should be consulted and the installation made by their experts. These men are not only trained, but have the benefits of the factory's traveling engineers' instruction. These service experts will check up the performance of the carburetor and remedy troubles more quickly than the dealer's mechanics and at less cost to truck owner.

"Need More Local Service Associations" —Says Cobleigh

WITH Henry Holt, the new president of the Automotive Service Assn. of N. Y., in the chair, the February meeting got away to a good start, and was well attended. Harry Cobleigh, secretary of service committee, N. A. C. C., was the speaker of the evening, and his subject was "The Uplook for Service." Mr. Cobleigh stated that the falling off in sales has stimulated the service idea more than anything else, and that the decrease in the price for cars is a good thing for the industry because the cheaper the cars the more cars will be bought. But the big thing the industry has before it is to build cars so that they will be cheaper to maintain. In this respect Cobleigh said:

"We have labored earnestly and commendably for lower cost of fuel and more economical use of it, but we know that gasoline is one of the smallest items of expense in running a car or truck.

"Repairs and overhauls represent the bulk of maintenance cost, and in these the biggest reducible element is the labor charge. Improved design to increase accessibility and reduce the time for overhaul will have increased attention from now on and go far toward accomplishing the desired end, but there would yet remain a great deal to be done and the most promising agency at hand is education toward the employment of better ways and means by all the factors engaged in rendering service to the car owner.

"There are various ways in which this education can be administered.

"The Service Division of the National Automobile Chamber of Commerce is en-

deavoring to do what it can for the factories and, through them, for their dealers, but the great work is that which will reach to the farthest extremes of the industry, to the service folk who have direct contact with the public and by whose performance service is judged. This work can be done best through local service associations, such as yours here in New York.

"We find ourselves selling now a motor-wise public. At least 80 per cent of our sales—if not more—are to those who have already owned cars, and, naturally, we find them paying more and more attention to the reputation of the car as an instrument of transportation in the hands of users than to mechanical features of eye-appeal, that have heretofore made up the bulk of the salesman's arguments. The customers are becoming more concerned as to the character of service the dealer renders than with pride of ownership of the new vehicle. First cost is seldom now the sole determining factor in choice of purchase. Equal or greater consideration is given to its value as judged by performance and low cost of upkeep."

In concluding his remarks, he said:

"One of the most certain signs in the skies that there is immediately ahead of us—an uplook for service—is the broader meaning that the term has assumed. There is increasing appreciation of the fact that its real significance is care of the car owner, rather than care of the car, that, after all, mechanical repairs and adjustments are only a means to the end of making the car owner happy, hence there are two other features in the conduct of

a service station that are equally as important as ability—these are courtesy and honesty. No matter how good the repair job, it fails to satisfy if the charge is excessive, and even the right price and the right work are not sufficient, if courtesy has been lacking in the receipt and delivery of the job. That make of car is going to enjoy the most appreciation that has a consistent reputation for service of this kind throughout the territory in which it is sold and used."

The topic for general discussion was "Lower the Cost to Owners," which was one of eleven subjects selected from suggestions made by members and the result of a questionnaire. It developed that the mechanic was a big factor, and there were diversified opinion as to same so it was voted to invite the mechanics to attend the next meeting when a speaker to address them will be secured and the mechanics given an opportunity to make suggestions. It should prove an interesting meeting.

Among the other subjects to be analyzed in discussion are the following: "Sales and Their Relation to Service"; "Salesmanship"; "The Co-operation of Sales and Service"; "Reducing Overhead Expenses"; "Should Time be Charged After 12 O'clock Saturday All the Year?"; "How Can We Enlist More Real Service Managers In Our Association?"; "Should We Charge the Annual Dues?"; "Is So-called 'Farmed-out' Service Satisfactory to Owners?"; "Parts Makers' Service and Distribution Methods"; "Valves, Single vs. Dual, as to Warp-age."

Replacement Table—Corrected Monthly

Including Piston Ring Sizes, Carburetor Sizes, Hose Sizes, Fan Belt Sizes, Brake Lining Sizes and Truck Frame Dimensions

Note: Under Carburetor Inlet Diameter Will be Found Either the Size of Main Air Intake or the Gasoline Fuel Line

Fan Belt Type: V—V-Shape, F—Flat, R—Round

Name, Model and Tonnage	ENGINE											BRAKE LINING								FRAME		
	Piston Rings		Carburetor		Upper Hose		Lower Hose		Fan Belt			Service				Emergency				Length	Width	
	No. per Cyl.	Width	Outlet Diameter	Inlet Diameter	Vertical or Horizontal	Length	Width	Length	Width	Length	Width	Type	Length	Width	Thickness	No. of Pieces	Length	Width	Thickness	No. of Pieces	Back of Driver's Seat	Over All
Acason R-1—1920.	4	1 1/4	1										11 1/2	3	3 1/4	2	11 1/2	3	3 1/4	2	112	34
Acason RB-1 1/2—1920.	4	1 1/4	1										11 1/2	3	3 1/4	2	11 1/2	3	3 1/4	2	112	34
Acason H-2 1/2—1920.	3	1 1/4	1										13 1/2	3 1/4	3 1/4	2	13 1/2	3 1/4	3 1/4	2	130	35
Acason L-3 1/2—1920.	3	1 1/4	1										16	3 1/4	3 1/4	2	16	3 1/4	3 1/4	2	163 1/2	35
Acason M-5—1920.	3	1 1/4	1										18	4 1/4	3 1/4	2	18	4 1/4	3 1/4	2	167 1/2	35
Ace, Series A 1 1/2—1920.	3	1 1/4	1	H	10 1/2	2 1/2	6 1/2	2	37 1/2	1	F	12	3 1/4	3 1/4	2	12	3 1/4	3 1/4	2	122 1/2	32	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	10 1/2	2 1/2	5 1/2	1 1/2	33	1 1/4	F	13	3 1/4	3 1/4	4	13	3 1/4	3 1/4	4	144 1/2	32	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	11	2 1/2	11	2	38 1/2	1 1/4	F	10 1/2	2 1/2	3 1/4	4	10 1/2	2 1/2	3 1/4	4	110 1/2	34	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	11	2 1/2	11	2	38 1/2	1 1/4	F	12	3 1/4	3 1/4	4	12	3 1/4	3 1/4	4	110 1/2	34	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	8	1 1/2	11 1/2	1 1/2	40	1 1/4	F	13	3 1/4	3 1/4	4	13	3 1/4	3 1/4	4	123 1/2	34	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	7	1 1/2	11	1 1/2	33 1/2	1 1/4	F	13	3 1/4	3 1/4	4	13	3 1/4	3 1/4	4	135	34	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	10	1 1/2	13	1 1/2	33 1/2	1 1/4	F	13	3 1/4	3 1/4	4	13	3 1/4	3 1/4	4	140 1/2	34	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	11 1/2	1 1/2	13	1 1/2	33 1/2	1 1/4	F	15 1/2	3 1/4	3 1/4	4	15 1/2	3 1/4	3 1/4	4	150 1/2	36	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	11	2	11 1/2	2	40 1/2	2	F	18	4	3 1/4	4	18	4	3 1/4	4	159 1/2	37	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	9	1 1/2	7 1/2	1 1/2	36 1/2	2	F	19 1/2	1 1/2	3 1/4	4	19 1/2	1 1/2	3 1/4	4	162 1/2	37	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	19	1 1/2	17 1/2	1 1/2	38	2	F	19	2 1/4	3 1/4	4	19	2 1/4	3 1/4	4	142	33	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	19	1 1/2	9 1/2	1 1/2	38	2	F	57	2 1/2	3 1/4	2	41 1/2	2 1/2	3 1/4	2	142	37	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	19	1 1/2	9 1/2	1 1/2	38	2	F	57	2 1/2	3 1/4	2	41 1/2	2 1/2	3 1/4	2	158	37	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	7 1/2	2	12	2	36 1/2	1 1/4	F	42	2	2	2	41 1/2	2	2	2	102	35 1/2	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	7 1/2	2	12	2	36 1/2	1 1/4	F	42	2	2	2	41 1/2	2	2	2	102	35 1/2	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	7 1/2	1 1/4	8	2	32	1	F	54	2 1/2	2	2	53 1/2	2 1/2	2	2	128	31 1/2	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	12	2	15 1/2	2	34 1/2	1 1/4	F	42	2	2	2	41 1/2	2	2	2	102	35 1/2	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	13	1 1/2	16 1/2	1 1/2	31 1/2	2	F	11 1/2	3 1/4	3 1/4	4	11 1/2	3 1/4	3 1/4	4	104 1/2	32	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	12 1/2	2	16 1/2	1 1/2	36	2	F	42	3	3 1/4	4	1	16	3 1/4	4	150	36	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	10	1 1/2	11 1/2	1 1/2	34	2	F	13 1/2	3 1/4	3 1/4	4	13 1/2	3 1/4	3 1/4	4	140	32	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	11	2	11	1 1/2	31 1/2	2	F	25 1/2	2 1/2	3 1/4	4	18	2 1/2	3 1/4	4	109 1/2	32	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	11	2	11	1 1/2	31 1/2	2	F	46	2 1/2	3 1/4	2	46	2 1/2	3 1/4	2	109 1/2	32	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	11	2	11	1 1/2	31 1/2	2	F	25 1/2	2 1/2	3 1/4	4	18	2 1/2	3 1/4	4	124 1/2	33	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	12	2	11	1 1/2	33 1/2	1 1/4	F	40	2 1/2	1 1/2	4	22 1/2	2 1/2	3 1/4	4	84 1/2	33 1/2	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	9	2 1/2	14 1/2	2 1/2	31 1/2	1	F	11 1/2	3 1/4	3 1/4	4	11 1/2	3 1/4	3 1/4	4	122 1/2	34	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	8	1 1/2	14 1/2	1 1/2	38 1/2	1 1/4	F	13 1/2	3 1/4	3 1/4	4	13 1/2	3 1/4	3 1/4	4	133 1/2	34	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	5 1/2	1 1/2	6 1/2	1 1/2	30 1/2	1 1/4	F	15 1/2	3 1/4	3 1/4	4	15 1/2	3 1/4	3 1/4	4	145 1/2	37 1/2	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	8	1 1/2	6	1 1/2	30 1/2	1 1/4	F	17 1/2	4	3 1/4	4	17 1/2	4	3 1/4	4	157 1/2	37 1/2	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	14	2	20 1/2	2	40	2	F	16 1/2	2 1/2	3 1/4	4	13	2 1/2	3 1/4	4	91	34	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	3	1 1/2	4	1 1/2	40	2	F	25 1/2	2 1/2	3 1/4	4	13	2 1/2	3 1/4	4	114	34	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	3	1 1/2	4	1 1/2	40	2	F	25 1/2	2 1/2	3 1/4	4	13	2 1/2	3 1/4	4	121	34 1/2	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	3 1/2	1 1/2	3	1 1/2	48 1/2	1 1/2	F	25 1/2	2 1/2	3 1/4	4	25 1/2	2 1/2	3 1/4	4	176	34 1/2	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	3 1/2	1 1/2	3	1 1/2	48 1/2	1 1/2	F	48	2 1/2	3 1/4	2	36	2 1/2	3 1/4	2	120	32	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	11	1 1/2	14	1 1/2	40	2	F	13 1/2	3 1/4	3 1/4	4	13 1/2	3 1/4	3 1/4	4	144	32	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	11	1 1/2	14	1 1/2	40	2	F	16	3 1/4	3 1/4	4	16	3 1/4	3 1/4	4	168	36	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	12	2	16	2	40	2	F	18	4	3 1/4	4	18	4	3 1/4	4	168	36	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	12	2	16	2	40	2	F	72	3 1/2	3 1/4	2	72	3 1/2	3 1/4	2	168	36	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	H	12	1 1/2	14	1 1/2	40	2	F	48	2 1/2	3 1/4	2	36	2 1/2	3 1/4	2	120	32	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	12	1 1/2	14	1 1/2	40	2	F	13 1/2	3 1/4	3 1/4	4	13 1/2	3 1/4	3 1/4	4	144	32	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	12	1 1/2	14	1 1/2	40	2	F	16	3 1/4	3 1/4	4	16	3 1/4	3 1/4	4	168	36	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	12	1 1/2	14	1 1/2	40	2	F	18	4	3 1/4	4	18	4	3 1/4	4	168	36	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	12	1 1/2	14	1 1/2	40	2	F	72	3 1/2	3 1/4	2	72	3 1/2	3 1/4	2	168	36	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	12	2	16	2	40	2	F	19 1/2	2	3 1/4	4	18 1/2	2	3 1/4	4	85	34	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	10	2	6 1/2	2	31 1/2	1 1/2	F	36	2 1/2	3 1/4	1	42	3	3 1/4	1	110	34	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	10	2	10	1 1/2	32	2	F	39	2 1/2	3 1/4	1	48	3	3 1/4	1	114	34	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	10	2	10	1 1/2	32	2	F	48	2 1/2	3 1/4	1	54	3	3 1/4	1	126	34	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	10	2	10	1 1/2	32	2	F	32	2	3 1/4	2	31	1 1/2	3 1/4	2	78	34	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	10	2	10	1 1/2	32	2	F	41	2	3 1/4	2	40	1 1/2	3 1/4	2	120	36	
Ace, Series A 2 1/2—1919-20.	4	1 1/4	1	V	10	2	10	1 1/2	32	2	F	51	3	3								

Replacement Table—Continued

Name, Model and Tonnage	ENGINE										BRAKE LINING							FRAME				
	Piston Rings	Carburetor			Upper Hose		Lower Hose		Fan Belt			Service				Emergency			Length	Width		
	No. per Cyl.	Width	Outlet Diameter	Inlet Diameter	Vertical or Horizontal	Length	Width	Length	Width	Length	Width	Type	Length	Width	Thickness	No. of Pieces	Length	Width	Thickness	No. of Pieces	Back of Driver's Seat	Over All
Columbia H.	3	1 1/4	1 1/4	1 1/4	V	12	2	11	1 1/4	38	1 1/4	F	42	2 1/2	1/4	2	40 1/2	1 1/4	1/4	2	120	32 1/2
Commerce T-1500	3	1 1/4	1 1/4	1 1/4	V	10	2	10	2	44	1 1/4	F	50	2 1/2	1/4	2	48 1/2	1 1/4	1/4	2	92 1/2	34
Commerce 12-3000	3	1 1/4	1 1/4	1 1/4	V	10	2	10	2	44	1 1/4	F	45	2 1/2	1/4	2	43	1 1/4	1/4	2	99 1/2	31
Commerce 16-4000	3	1 1/4	1 1/4	1 1/4	V	10	2	10	2	44	1 1/4	F	50 3/4	2 1/2	1/4	2	48	1 1/4	1/4	2	108 1/2	34
Commerce 18-5000	3	1 1/4	1 1/4	1 1/4	V	6	1 1/2	11	1 1/2	33	1 1/4	F	50 3/4	2 1/2	1/4	2	48	1 1/4	1/4	2	128 1/2	34
Concord A-2—1921	4	1 1/4	1 1/4	1 1/4	H	11	2 1/2	9 1/2	1 1/2	34	2	F	12	3 1/4	1/4	4	12	3 1/4	1/4	4	108 1/4	32 1/2
Concord AX-2—1921	4	1 1/4	1 1/4	1 1/4	H	11	2 1/2	9 1/2	1 1/2	34	2	F	12	3 1/4	1/4	4	12	3 1/4	1/4	4	122 1/2	32 1/2
Concord B-3—1921	4	1 1/4	1 1/4	1 1/4	H	11	2 1/2	9 1/2	1 1/2	34	2	F	13 1/2	3 1/2	1/4	4	13 1/2	3 1/2	1/4	4	122 1/2	32 1/2
Concord BX-3—1921	4	1 1/4	1 1/4	1 1/4	H	11	2 1/2	9 1/2	1 1/2	34	2	F	13 1/2	3 1/2	1/4	4	13 1/2	3 1/2	1/4	4	155 1/2	32 1/2
Corbitt E-1—1917-20	3	1	1	1	V	8	2	14	2	38	1 1/4	F	19	2	1/4	2	19	2	1/4	2	105	34
Corbitt D-1 1/2—1916-20	3	1 1/4	1 1/4	1 1/4	V	8	2	14	2	38	1 1/4	F	45 1/4	2	1/4	2	45 1/4	2	1/4	2	120	34
Corbitt C-2—1915-20	3	1 1/4	1 1/4	1 1/4	V	14	1 1/2	13	1 1/2	36	1 1/4	F	51 1/2	2 1/4	1/4	1	51 1/2	2 1/4	1/4	1	138	35
Corbitt B-2 1/2—1916-20	3	1 1/4	1 1/4	1 1/4	V	14	1 1/2	13	1 1/2	36	1 1/4	F	51 1/2	2 1/4	1/4	1	51 1/2	2 1/4	1/4	1	138	35
Corbitt AA-5—1919-20	3	1 1/4	1 1/4	1 1/4	V	13	1 1/4	8	1 1/4	36	2	F	69 1/4	3	1/4	1	69 1/4	3	1/4	1	160	38
Corbitt A-3 1/2—1917-20	3	1 1/4	1 1/4	1 1/4	V	13	1 1/4	14	2	36	1 1/4	F	64	2 1/2	1/4	1	64	2 1/2	1/4	1	160	35
Cyclone A-3000	3	1	1	1	V	16	2	16	2	32 1/2	1 1/4	F	21 1/4	2 1/2	1/4	4	19 1/4	2 1/2	1/4	4	113	34
Dart S-1 1/2—1920-21	3	1 1/4	1 1/4	1 1/4	H	11	2	8	1 1/2	36	1	F	19	1 1/2	1/4	4	19	1 1/2	1/4	4	112	34
Dart M-2 1/2—1920-21	4	1 1/4	1 1/4	1 1/4	H	11	2	14	1 1/2	35	2	F	10	2 1/2	1/4	2	19	3 1/2	1/4	4	124	34
Dart W-3 1/2—1920-21	4	1 1/4	1 1/4	1 1/4	H	11	2	12	1 1/2	36	2	F	28	2 1/2	1/4	4	28	2 1/2	1/4	4	144	38
Day-Elder AS-1	3	1 1/4	1 1/4	1 1/4	V	9	2	9 1/2	2	40	1 1/4	F	19	2	1/4	4	19	2	1/4	4	108	35
Day-Elder B-1 1/2	3	1 1/4	1 1/4	1 1/4	V	9	2	9 1/2	2	40	1 1/4	F	19	2	1/4	4	19	2	1/4	4	120	35
Day-Elder D-2	3	1 1/4	1 1/4	1 1/4	V	4	1 1/2	9	1 1/2	35	1 1/4	F	45	2	1/4	2	45	2	1/4	2	125	35
Day-Elder C-2 1/2	3	1 1/4	1 1/4	1 1/4	V	10 1/2	2	12	1 1/2	36 1/2	2	F	52	2 1/4	1/4	2	52	2 1/4	1/4	2	123	35
Day-Elder F-3 1/2	3	1 1/4	1 1/4	1 1/4	V	6 1/2	1 1/4	12	1 1/2	35 1/2	1 1/4	F	56 1/2	2 1/2	1/4	2	56 1/2	2 1/2	1/4	2	148	35
Day-Elder E-5	3	1 1/4	1 1/4	1 1/4	V	12 1/2	2	10	1 1/2	38 1/2	1 1/2	F	69	3	1/4	2	69	3	1/4	2	155	37
Dearborn BW-2—1915-17-19-20	3	1	1	1	V	8 1/2	2	6	1 1/2	37	1	F	18	2 1/2	1/4	2	18	1 1/2	1/4	2	130	32
Dearborn F-1 1/2—1915-17-19-20	3	1	1	1	V	12	2	8	1 1/2	37	1	F	16 1/2	2 1/2	1/4	2	16 1/2	2 1/2	1/4	2	98 1/2	34
Dearborn C-1—1915-17-19-20	3	1	1	1	V	10	2	8	1 1/2	40 1/4	1 1/4	F	45	2 1/2	1/4	1	45	2 1/2	1/4	1	107	34
Defiance B-1 1/2—1918-19-20	3	1	1	1	V	10	2	8	1 1/2	40 1/4	1 1/4	F	54 1/4	2 1/2	1/4	1	52 1/4	2 1/2	1/4	1	116	34
Defiance C-2—1918-19-20	3	1	1	1	V	10	2	8 1/2	1 1/4	40 1/4	1 1/4	F	45	2 1/2	1/4	1	52 1/4	2 1/2	1/4	1	120	34
Defiance D—1920-21	3	1	1	1	V	10	2	8 1/2	1 1/4	40 1/4	1 1/4	F	54 1/4	2 1/2	1/4	1	52 1/4	2 1/2	1/4	1	120	34
Defiance E—1920-21	3	1	1	1	V	10	2	8 1/2	1 1/4	40 1/4	1 1/4	F	49	2 1/2	1/4	2	47 1/2	2 1/2	1/4	2	97 1/2	34
Denby 31-1 1/2—1921	3	1 1/4	1 1/4	1 1/4	V	6	2 1/2	19	2 1/2	33 1/2	1 1/4	F	8 1/2	4	1/4	2	46 1/2	1 1/2	1/4	2	120	33 1/2
Denby 33-1 1/2—1921	3	1 1/4	1 1/4	1 1/4	V	9	2	12	2	41 1/4	1 1/4	F	53 1/4	3	1/4	2	50 1/4	3	1/4	2	127	34
Denby 134-2—1921	3	1 1/4	1 1/4	1 1/4	V	9	2	12	2	41 1/4	1 1/4	F	53 1/4	3	1/4	2	50 1/4	3	1/4	2	127	34
Denby 25-3—1921	3	1 1/4	1 1/4	1 1/4	V	13	1 1/4	16 1/4	1 1/2	32	1 1/2	F	8 1/2	4	1/4	2	47 1/4	2	1/4	2	140	34
Denby 27-4—1921	3	1 1/4	1 1/4	1 1/4	V	13	1 1/4	16 1/4	1 1/2	32	1 1/2	F	8 1/2	4	1/4	2	47 1/4	2	1/4	2	140	34
Denby 210-5—1921	3	1 1/4	1 1/4	1 1/4	V	14	2 1/2	15	1 1/4	37 1/2	2	F	53 1/4	2 1/4	1/4	1	38 1/4	2 1/4	1/4	1	108	33 1/2
Dependable Dispatch A-1 1921	4	1	1	1	V	14	2 1/2	15	1 1/4	37 1/2	2	F	53 1/4	2 1/4	1/4	1	38 1/4	2 1/4	1/4	1	121	35
Dependable C-1 1/2—1920-21	4	1	1	1	V	10	2 1/2	11 1/2	1 1/4	37 1/2	2	F	53 1/4	2 1/4	1/4	1	38 1/4	2 1/4	1/4	1	140	35
Dependable D-2 1920-21	4	1	1	1	V	10	2 1/2	11 1/2	1 1/4	37 1/2	2	F	53 1/4	2 1/4	1/4	1	38 1/4	2 1/4	1/4	1	152	83
Dependable E-2 1/2—1920-21	4	1	1	1	V	13	2	13	1 1/4	37 1/2	2	F	63	2 1/2	1/4	1	49	2 1/2	1/4	1	170	33
Dependable G-3 1/2 1921	4	1	1	1	V	9	1 1/4	6	1 1/4	35	2	F	48	2 1/2	1/4	2	33	2 1/2	1/4	2	100	34
Diamond T-O-3-1	3	1	1	1	V	9	1 1/4	6	1 1/4	35	2	F	11 1/2	3 1/4	1/4	4	11 1/2	3 1/4	1/4	4	Opt	34
Diamond T-FS&T-1 1/2	3	1	1	1	V	9	1 1/4	6	1 1/4	35	2	F	13 1/4	3 1/2	1/4	4	13 1/4	3 1/2	1/4	4	Opt	34
Diamond T-U-2	3	1	1	1	V	10	1 1/2	10	1 1/2	35	2	F	15 1/8	3 3/4	1/4	4	15 1/8	3 3/4	1/4	4	Opt	37
Diamond TK-3 1/2	3	1	1	1	V	10	1 1/2	10	1 1/2	35	2	F	18	4	1/4	4	17 1/4	4	1/4	4	Opt	37
Diamond T-EL-5	3	1	1	1	V	9	2	21	2	40 1/4	2	F	18	4	1/4	4	17 1/4	4	1/4	4	Opt	37
Diamond T-S-5	3	1	1	1	V	9	2	21	2	40 1/4	2	F	28	2 1/2	1/4	2	27	2 1/2	1/4	2	90	34
Diehl A	3	1 1/4	1 1/4	1 1/4	H	9	1 1/4	12	1 1/4	32	1 1/2	F	35	3	1/4	2	18	3 1/2	1/4	4	126	53
Doane 2 1/2—1917-18-19-20	3	1 1/4	1 1/4	1 1/4	H	12	1 1/4	15	1 1/4	38 1/2	1 1/2	F	35	3	1/4	2	18	3 1/2	1/4	4		

Replacement Table—Continued

Name, Model and Tonnage	ENGINE											BRAKE LINING								FRAME		
	Piston Rings		Carburetor		Upper Hose		Lower Hose		Fan Belt			Service				Emergency				Length	Width	
	No. per Cyl.	Width	Outlet Diameter	Inlet Diameter	Vertical or Horizontal	Length	Width	Length	Width	Length	Width	Type	Length	Width	Thickness	No. of Pieces	Length	Width	Thickness	No. of Pieces	Back of Driver's Seat	Over All
G.M.C. K-101	4	1 1/4	1 1/4	1 1/4	V	11 3/4	1 3/4	9 1/4	1 3/4	37 3/4	1 3/4	V	17 3/4	4	1/4	4	17 3/4	4	1/4	4	Opt	38
Gramm-Pioneer 10 Speed—1921	4	1 1/4	1 1/4	1 1/4	V	12	2 1/4	14 1/4	2 1/4	29	1 1/4	F	48 1/4	2	1/4	2	26	4	1 1/4	2	97	30 1/4
Gramm-Pioneer 15-1 1/2—1921	4	1 1/4	1 1/4	1 1/4	V	10 1/4	1 1/4	6	1 1/4	39	1 1/4	F	19 1/4	2	1/4	2	45 1/4	4	1 1/4	2	120	32
Gramm-Pioneer 65-1 1/2—1921	4	1 1/4	1 1/4	1 1/4	V	10 1/4	1 1/4	6	1 1/4	39	1 1/4	F	45	2	1/4	2	45	2	1 1/4	2	126	32
Gramm-Pioneer 20-2—1921	4	1 1/4	1 1/4	1 1/4	V	11	1 1/4	9	1 1/4	32	2	F	22 1/4	2 1/4	1/4	4	22 1/4	2 1/4	1/4	4	129 1/4	36
Gramm-Pioneer 30-3—1922	4	1 1/4	1 1/4	1 1/4	V	11	1 1/4	9	1 1/4	33 1/4	2	F	22 1/4	2 1/4	1/4	4	22 1/4	2 1/4	1/4	4	144	36
Gramm-Pioneer 75P-3 1/2—1922	4	1 1/4	1 1/4	1 1/4	V	11	1 1/4	9	1 1/4	33 1/4	2	F	22 1/4	2 1/4	1/4	4	22 1/4	2 1/4	1/4	4	162	36
Gramm-Pioneer 40-4—1922	4	1 1/4	1 1/4	1 1/4	V	23 1/4	2	13 1/4	1 1/4	40 1/4	2	F	32 1/4	2 1/4	1/4	2	47	1 1/2	1 1/2	2	89	32
Gramm-Pioneer 50-5-6—1922	4	1 1/4	1 1/4	1 1/4	V	12	1 1/4	11	1 1/4	37	2	F	45	2 1/4	1/4	2	45	2 1/4	1/4	2	144	38
G. W. W.	4	1 1/4	1 1/4	1 1/4	V	8	1 1/4	12 1/4	1 1/4	32	1 1/4	F	15 1/2	3	1/4	4	11 1/2	3	1/4	4	144	38
Hall 2-Worm-2 1/2	4	1 1/4	1 1/4	1 1/4	V	12 1/4	1 1/4	15 1/4	1 1/4	38 1/4	1 1/4	F	18	4	1/4	4	18	4	1/4	4	144	39
Hall 3 1/2-Worm	4	1 1/4	1 1/4	1 1/4	V	12 1/4	1 1/4	15 1/4	1 1/4	38 1/4	1 1/4	F	18	4	1/4	4	18	4	1/4	4	144	39
Hall 5-Worm	4	1 1/4	1 1/4	1 1/4	V	12 1/4	1 1/4	15 1/4	1 1/4	38 1/4	1 1/4	F	44	2	1/4	2	44	2	1/4	2	136	32
Hall 7-Chain	4	1 1/4	1 1/4	1 1/4	V	12	2	10	1 1/4	34	1	F	50	2 1/4	1/4	2	50	2 1/4	1/4	2	136	32
Harvey WOA-2	4	1 1/4	1 1/4	1 1/4	V	12	2	10	1 1/4	35	1 1/4	F	56 1/2	2 1/4	1/4	2	56 1/2	2 1/4	1/4	2	144	35
Harvey WFA-2 1/2	4	1 1/4	1 1/4	1 1/4	V	12	2	10	1 1/4	37	1 1/4	F	12	3 1/4	1/4	4	12	3 1/4	1/4	4	Opt	32 1/4
Harvey WHA-3 1/2	4	1 1/4	1 1/4	1 1/4	V	12	2	10	1 1/4	37	1 1/4	F	16	4	1/4	4	16	4	1/4	4	Opt	36
Hendrickson I-2 1/2	4	1 1/4	1 1/4	1 1/4	V	14	2 1/4	10	2 1/4	53	1 1/4	V	18	4	1/4	4	18	4	1/4	4	Opt	38
Hendrickson J-3 1/2	4	1 1/4	1 1/4	1 1/4	V	14	2 1/4	10	2 1/4	53	1 1/4	V	57	3 1/4	1/4	2	69	3 1/4	1/4	2	147	38
Hendrickson K-5	4	1 1/4	1 1/4	1 1/4	V	14	2 1/4	10	2 1/4	53	1 1/4	V	12	1 1/2	1/4	2	12	1 1/2	1/4	2	85	32
Highway Knight A	4	1 1/4	1 1/4	1 1/4	V	9	2	7	2	32	1 1/4	R	18	2	1/4	2	18	2	1/4	2	100	32
Highway Knight B-5	4	1 1/4	1 1/4	1 1/4	V	9	2	7	2	32	1 1/4	R	2	2	1/4	2	22	2	1/4	2	132	35 1/4
Higrade A18-1—1918-19	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	24	2 1/2	1/4	2	23	2 1/2	1/4	2	154	34
Higrade B20-1 1/2—1919-20	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	26	3	1/4	2	27	3	1/4	2	144 1/4	34
Hurlburt A1 1/2-2	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	28	3	1/4	2	50	2	1/4	2	121	33
Hurlburt B2 1/2	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	15	3	1/4	2	50	2 1/2	1/4	2	145	33
Hurlburt C3 1/2-4	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	17 1/2	2	1/4	2	44	2	1/4	2	108	32
Hurlburt D5-5 1/2	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	44	2	1/4	2	51	2 1/4	1/4	2	126	33
Huron-Erie 1 1/2	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	51	2 1/2	1/4	2	56	2 1/2	1/4	2	138	33
Huron-Michigan 2 1/2	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	56	2 1/2	1/4	2	68	3	1/4	2	144	34 1/4
Indiana 12-1 1/2—1921	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	68	3	1/4	2	36	2	1/4	2	156	37 1/4
Indiana 20-2—1921	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	38	2	1/4	2	43 1/4	2 1/4	1/4	2	75 1/4	34
Indiana 25-2 1/2—1921	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	43 1/4	2 1/4	1/4	2	43 1/4	2 1/4	1/4	2	106 1/4	34
Indiana 35-3 1/2—1921	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	50 1/4	2 1/4	1/4	2	50 1/4	2 1/4	1/4	2	111	32 1/4
Indiana 51-5—1921	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	50 1/4	2 1/4	1/4	2	50 1/4	2 1/4	1/4	2	118 1/4	34
International S-1500 lbs.—Speed Truck '21	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	73 1/4	2 1/4	1/4	2	73 1/4	2 1/4	1/4	2	147 1/4	34
International 21-2000 lbs.—1916-21	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	58 1/4	2 1/4	1/4	2	58 1/4	2 1/4	1/4	2	150	36
International 31-3000 lbs.—1916-21	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	50	2 1/4	1/4	2	48	2 1/4	1/4	2	120	32 1/4
International 41-4000 lbs.—1918-21	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	90	2 1/4	1/4	2	60	2 1/4	1/4	2	144	33
International 61-6000 lbs.—1918-21	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	60	2 1/4	1/4	2	68	3	1/4	2	152	36
International 101-10,000 lbs.—1920-21	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	68	3	1/4	2	21	2	1/4	2	90	34
Jackson B 3 1/2	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	42	2	1/4	2	45	2 1/4	1/4	2	120	34
Kalamazoo G-2-1 1/2	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	45	2 1/4	1/4	2	45	2 1/4	1/4	2	138	34
Kalamazoo H-2 1/2	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	45	2 1/4	1/4	2	45	2 1/4	1/4	2	138	34
Kalamazoo K-3 1/2	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	45	2 1/4	1/4	2	45	2 1/4	1/4	2	138	34
Kalamazoo K-5	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	45	2 1/4	1/4	2	45	2 1/4	1/4	2	138	34
Kearns H-4	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	45	2 1/4	1/4	2	45	2 1/4	1/4	2	138	34
Kearns N-1 1/2	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4	38 1/4	1 1/4	F	45	2 1/4	1/4	2	45	2 1/4	1/4	2	138	34
Kelly-Springfield K31 1 1/2	4	1 1/4	1 1/4	1 1/4	V	17	1 1/4	14	1 1/4													

Replacement Table—Continued

Name, Model and Tonnage	ENGINE											BRAKE LINING							FRAME			
	Piston Rings		Carburetor		Upper Hose		Lower Hose		Fan Belt			Service				Emergency			Length	Width		
	No. per Cyl.	Width	Outlet Diameter	Inlet Diameter	Vertical or Horizontal	Length	Width	Length	Width	Length	Width	Type	Length	Width	Thickness	No. of Pieces	Length	Width	Thickness	No. of Pieces	Back of Driver's Seat	Over All
Master JW-1½—1919-21	4	1½	1½	2	H	13½	2	12½	1½	30½	1	F	12	3½	1½	2	12	3½	1½	2	117½	34½
Master M-2½—1916-20	4	1½	1½	2	H	13½	2	12½	1½	33	1	F	74½	3½	1½	1	74½	3½	1½	1	117½	34
Master O 2½—1917-20	4	1½	1½	2	H	13½	2	12½	1½	33	1	F	74½	3½	1½	1	74½	3½	1½	1	156½	34
Master W-2½—1916-21	4	1½	1½	2	H	13½	2	12½	1½	31	1	F	13½	3½	1½	2	13½	3½	1½	2	117½	34
Master WL 2½—1917-21	4	1½	1½	2	H	13½	2	12½	1½	31	1	F	13½	3½	1½	2	13½	3½	1½	2	156½	34
Master D-2½—1920-21	4	1½	1½	2	H	13½	2	12½	1½	35	1	F	8½	3½	1½	2	54	3	3	2	117½	34
Master DL-2½—1920-21	4	1½	1½	2	H	13½	2	12½	1½	35	1	F	8½	3½	1½	2	54	3	3	2	156½	34
Master T-6 Tractor—1917-21	4	1½	1½	2	H	13½	2	12½	1½	33	1	F	74½	3½	1½	1	74½	3½	1½	1	72½	34
Master A-3½—1918-21	4	1½	1½	2	H	13½	2	15	1½	35	2	F	16	3½	1½	2	16	3½	1½	2	147½	36
Master AL-3½—1918-21	4	1½	1½	2	H	13½	2	15	1½	35	2	F	16	3½	1½	2	16	3½	1½	2	183½	36½
Master E-3½—1920-21	4	1½	1½	2	H	13½	2	15	1½	35	2	F	11	6	1	2	25	4	4	2	147½	36½
Master EL-3½—1920-21	4	1½	1½	2	H	13½	2	15	1½	35	2	F	11	6	1	2	25	4	4	2	183½	36½
Master B-5—1919-21	4	1½	1½	2	H	13½	2	15	1½	37	2	F	18	4	4	2	18	4	4	2	162½	39
Master BL-5—1919-21	4	1½	1½	2	H	13½	2	15	1½	37	2	F	18	4	4	2	18	4	4	2	186½	39
Master F-5—1920-21	4	1½	1½	2	H	13½	2	15	1½	37	2	F	11	6	1	2	25	4	4	2	162½	39
Master FL-5—1920-21	4	1½	1½	2	H	13½	2	15	1½	37	2	F	11	6	1	2	25	4	4	2	186½	39
Maxwell 1½—1917-20	3	1	1	1	H	6½	2½	7½	2½	44½	1½	F	16	1½	1½	4	16	1½	1½	4	102	36
Menominee HT-1—1918-20	3	1	1	1	V	9½	1½	10½	1½	33½	1½	F	12	3½	1½	2	12	3½	1½	2	104	32
Menominee H-1½—1916-20	3	1	1	1	V	9½	1½	10½	1½	33½	1½	F	13½	3½	1½	2	13½	3½	1½	2	122	32
Menominee D-2—1915-20	3	1	1	1	V	9½	1½	10½	1½	33½	1½	F	13½	3½	1½	2	13½	3½	1½	2	146	32
Menominee G-3½—1916-20	3	1	1	1	V	9½	1½	10½	1½	33½	1½	F	16	3½	1½	2	16	3½	1½	2	149	36
Menominee J-5—1917-20	3	1	1	1	V	9½	1½	10½	1½	33½	1½	F	18½	3½	1½	2	18½	3½	1½	2	149	36
Menominee Ht-1—1920-late	3	1	1	1	V	9½	1½	10½	1½	33½	1½	F	47	3½	1½	2	33½	2½	1½	2	102½	32
Menominee H-1—1920-late	3	1	1	1	V	9½	1½	10½	1½	33½	1½	F	47	3½	1½	2	33½	2½	1½	2	124	32
Menominee D-2—1920-late	3	1	1	1	V	9½	1½	10½	1½	33½	1½	F	57½	3½	1½	2	42½	2½	1½	2	131½	32
Menominee G-3½—1920-late	3	1	1	1	V	9½	1½	10½	1½	33½	1½	F	57½	3½	1½	2	42½	2½	1½	2	149	36
Menominee J-5—1920-late	3	1	1	1	V	9½	1½	10½	1½	33½	1½	F	69	3½	1½	2	52	2½	1½	2	149	36
Moline 10	3	1	1	1	H	10½	2½	4½	2½	42	2	F	21	2½	2½	2	20	2	2	2	108	32
Moreland 21B-1½—1919-20-21	3	1	1	1	V	9	1½	13	1½	42	1½	F	12	3½	1½	4	12	3½	1½	4	132	34
Moreland 21C-2½—1919-20-21	3	1	1	1	V	9	1½	13	1½	42	1½	F	13½	3½	1½	4	13½	3½	1½	4	156	34
Moreland 21H-4—1919-20-21	3	1	1	1	V	9	1½	13	1½	42	1½	F	16	3½	1½	4	16	3½	1½	4	168	38
Moreland 21J-5—1919-20-21	3	1	1	1	V	9	1½	13	1½	42	1½	F	18	4	4	2	18	4	4	2	168	38
Napoleon 9-1—1919-20	3	1	1	1	V	6	2½	12	2	36	1	F	44	2	2	1	30	2½	1½	1	101	35½
Napoleon 11-1½—1919-20	3	1	1	1	V	6	2½	12	2	36	1	F	49	2	2	1	30	2½	1½	1	101	35½
Nash 2018-1—1919-20	4	1½	1½	1	V	3	1½	7½	1½	44	1	F	49½	3	3	2	20	2½	1½	1	104½	30½
Nash 3018-2—1919-20	4	1½	1½	1	V	3	1½	7½	1½	44	1	F	50½	3	3	2	20	2½	1½	1	118½	31½
Nash 4017-2—1919-20	4	1½	1½	1	V	7	1½	12	2	44	2	F	49½	3	3	2	25	2½	1½	1	117½	38½
Nelson & LeMoon G 1½	4	1½	1½	1	V	12	1½	16	1½	40	1½	F	12	3½	1½	2	12	3½	1½	2	Opt	.....
Nelson & LeMoon G 2½	4	1½	1½	1	V	12	1½	16	1½	40	1½	F	12	3½	1½	2	12	3½	1½	2	Opt	.....
Nelson & LeMoon G 3½	4	1½	1½	1	V	12	1½	16	1½	40	1½	F	16½	3½	1½	2	16½	3½	1½	2	Opt	.....
Nelson & LeMoon G 5	4	1½	1½	1	V	12	1½	16	1½	40	1½	F	18	4	4	2	18	4	4	2	Opt	.....
Netco DK-2	3	1	1	1	V	12	1½	16	1½	40	1½	F	13	3½	1½	4	13	3½	1½	4	108½	34½
Netco HL-2½-3	3	1	1	1	V	13	1½	16	1½	41½	1½	F	13	3½	1½	4	13	3½	1½	4	195½	34½
Niles E-2	3	1	1	1	V	13	1½	16	1½	41½	1½	F	12	3½	1½	4	12	3½	1½	4	147	56
Noble B30-1½—1918-20	4	1½	1½	1	V	16½	1½	7	1½	30	1½	F	43	2	2	2	43	2	2	2	136	34
Noble C40-2—1919-20	4	1½	1½	1	V	12	1½	9	2	34½	1½	F	43	2	2	2	43	2	2	2	148	34
Noble D50-2½—1919-20	4	1½	1½	1	V	12	1½	9	2	34½	1½	F	51	2½	2½	2	51	2½	2½	2	172	34
Noble E70-3½—1919-20	4	1½	1½	1	V	16	1½	14½	2	34½	1½	F	57	2½	2½	2	57	2½	2½	2	172	36
Northway B-2	3	1	1	1	V	5½	2½	13½	1½	31	1	V	50½	2½	2½	2	50½	2½	2½	2	118	33
Northway B-3	3	1	1	1	V	5½	2½	13½	1½	31	1	V	54	2½	2½	2	54	2½	2½	2	173	34½
Norwalk 25B-1	3	1	1	1	V	9	2½	19	2½	29	2	F	16½	2½	2½	2	16½	2½	2½	2	100	36
Norwalk 35E-1½	3	1	1	1	V	9	2½	19	2½	29	2	F	16½	2½	2½	2	16½	2½	2½	2	124	34
Norwalk 35E Spec.-1½	3	1	1	1	V	11	2	18	1½	36	2	F	19	2	2	2	19	2	2	2	124	34
Ogden D-1½	3	1	1	1	V	13	2	12	2	36	1½	F	36	2	2	2	36	2	2	2	120	.....
Ogden E-2½	3	1	1	1	V	10	1½	14	1½	30	1½	F	36	2	2	2	36	2	2	2	144	.....
Ogden F-3½	3	1	1	1	V	11	1½	16	1½	36	1½	F	36	2	2	2	36	2	2	2	168	.....
Ogden G-5	3	1	1	1	V	9	2	18	2	40	2	F	53	2½	2½	2	53	2½	2½	2	168	.....
O. K.-1½—1920	4	1½	1½	1	V	12	2	13½	1½	36	2	F	62	2½	2½	2	62	2½	2½	2	117	34
O. K.-2½—1920	4	1½	1½</																			

Replacement Table—Continued

Name, Model and Tonnage	ENGINE										BRAKE LINING							FRAME				
	Piston Rings	Carburetor			Upper Hose		Lower Hose		Fan Belt		Service				Emergency			Length	Width			
	No. per Cyl	Width	Outlet Diameter	Inlet Diameter	Vertical for Horizontal	Length	Width	Length	Width	Length	Width	Type	Length	Width	Thickness	No. of Pieces	Length	Width	Thickness	No. of Pieces	Back of Driver's Seat	Over All
Rowe GPW3—1916-17, 1919-20.....	3	4	1 1/4	1 1/4	V	10	1 1/4	6	1 1/4	18	2	F	18	2	1/8	4	18	2	1/8	4	152	33
Rumely A-1 1/2.....	4	4	1 1/4	1 1/4	V	10 1/2	1 1/4	10 1/2	1 1/4	37	2	F	37	2	1/8	4	37	2	1/8	4	122	34
Samson 15-3/4.....	3	4	1 1/4	1 1/4	V	6 1/2	1 1/4	7 3/4	1 1/4	35	2	F	35 1/2	2	1/8	4	35 1/2	2	1/8	4	108 1/2	39 1/2
Samson 25-1 1/2.....	3	4	1 1/4	1 1/4	V	6 1/2	1 1/4	7 3/4	1 1/4	37	2	F	37 1/2	2	1/8	4	37 1/2	2	1/8	4	108 1/2	39 1/2
Sandow G-1—1918-20.....	3	4	1 1/4	1 1/4	V	10	1 1/4	6	1 1/4	20	2	F	20	2	1/8	4	20	2	1/8	4	96	34
Sandow CG-1 1/2—1918-20.....	3	4	1 1/4	1 1/4	V	10	1 1/4	6	1 1/4	20	2	F	20	2	1/8	4	20	2	1/8	4	120	34
Sandow I-2—1918-20.....	3	4	1 1/4	1 1/4	V	10	1 1/4	6	1 1/4	60	3	F	60	3	1/8	4	60	3	1/8	4	132	32
Sandow J-2 1/2—1918-20.....	3	4	1 1/4	1 1/4	V	10	1 1/4	6	1 1/4	13 1/2	3 1/2	F	13 1/2	3 1/2	1/8	4	16	3 1/2	1/8	4	144	32
Sandow L-5—1918-20.....	3	4	1 1/4	1 1/4	V	10	1 1/4	6	1 1/4	24	4 1/2	F	24	4 1/2	1/8	4	24	4 1/2	1/8	4	144	37
Sandow M-3 1/2—1918-20.....	3	4	1 1/4	1 1/4	V	10	1 1/4	6	1 1/4	18 1/2	4 1/2	F	18 1/2	4 1/2	1/8	4	18 1/2	4 1/2	1/8	4	144	37
Sanford 25-2 1/2—1917-20.....	3	4	1 1/4	1 1/4	V	10	1 1/4	6	1 1/4	51 1/2	2 1/2	F	51 1/2	2 1/2	1/8	4	51 1/2	2 1/2	1/8	4	144	37
Sanford W35-2 1/2—1917-20.....	3	4	1 1/4	1 1/4	V	10	1 1/4	6	1 1/4	56	2 1/2	F	56	2 1/2	1/8	4	56	2 1/2	1/8	4	144	35
Sanford W50-5—1917-20.....	3	4	1 1/4	1 1/4	V	10	1 1/4	6	1 1/4	69	3	F	69	3	1/8	4	69	3	1/8	4	145	35
Schacht F-2.....	4	4	1 1/4	1 1/4	H	11	2	14	1 1/4	37 1/2	2	F	37 1/2	2	1/8	4	13 1/2	3	1/8	4	140	35 1/4
Schacht F-3.....	4	4	1 1/4	1 1/4	H	11	2	14	1 1/4	37 1/2	2	F	37 1/2	2	1/8	4	13 1/2	3	1/8	4	140	35 1/4
Schacht E-4.....	4	4	1 1/4	1 1/4	H	10 1/2	2	13 1/2	1 1/4	39 1/2	2	F	39 1/2	2	1/8	4	15	4	1/8	4	152	35 1/4
Schacht E-5.....	4	4	1 1/4	1 1/4	H	10 1/2	2	13 1/2	1 1/4	39 1/2	2	F	39 1/2	2	1/8	4	15	4	1/8	4	152	35 1/4
Schacht E-7.....	4	4	1 1/4	1 1/4	H	10 1/2	2	13 1/2	1 1/4	39 1/2	2	F	39 1/2	2	1/8	4	15	4	1/8	4	152	35 1/4
Schwartz A-1 1/2—1921.....	3	4	1 1/4	1 1/4	V	9 1/2	2 1/2	13	2 1/2	19 1/2	1 1/4	F	19 1/2	1 1/4	1/8	4	19 1/2	1 1/4	1/8	4	120	34
Schwartz BW-1 1/2.....	4	4	1 1/4	1 1/4	V	10	1 1/4	18	1 1/4	33 1/2	2	F	33 1/2	2	1/8	4	19	2	1/8	4	120	34
Schwartz CWS-CW-CWL-2 1/2.....	4	4	1 1/4	1 1/4	V	10 1/2	2 1/2	15	1 1/4	43	2 1/2	F	43	2 1/2	1/8	4	43	2 1/2	1/8	4	120	34
Schwartz DWS-DW-DWL-5.....	4	4	1 1/4	1 1/4	V	12 1/2	2	17	1 1/4	69 1/2	3	F	69 1/2	3	1/8	4	69 1/2	3	1/8	4	114	34
Selden 1 1/2 A—1919-20.....	3	4	1 1/4	1 1/4	V	12	2	12	1 1/4	41	1 1/4	F	41	1 1/4	1/8	4	41	1 1/4	1/8	4	134	34
Selden 2 1/2 A—1920.....	3	4	1 1/4	1 1/4	V	9	1 1/4	12	1 1/4	31	1 1/4	F	31	1 1/4	1/8	4	31	1 1/4	1/8	4	114	34
Selden 3 1/2 A—1919-20.....	3	4	1 1/4	1 1/4	V	9	1 1/4	12	1 1/4	34 1/2	1 1/4	F	34 1/2	1 1/4	1/8	4	34 1/2	1 1/4	1/8	4	134	34
Selden 5 A—1920.....	3	4	1 1/4	1 1/4	V	7	2	20 1/2	2	40 3/4	2	F	40 3/4	2	1/8	4	15 3/4	3 3/4	1/8	4	153	37 1/4
Service 12-3/4-1922.....	3	4	1 1/4	1 1/4	V	13 1/2	2 1/2	14 1/2	2 1/2	35	2	F	35	2	1/8	4	13 1/2	2 1/2	1/8	4	101 1/2	37 1/4
Service 15-1921-3/4.....	3	4	1 1/4	1 1/4	V	10	1 1/4	2	1 1/4	35	2	F	35	2	1/8	4	13 1/2	2 1/2	1/8	4	101 1/2	37 1/4
Service 220-1-1919-20.....	3	4	1 1/4	1 1/4	V	10	2	6	1 1/4	37 1/2	1	F	37 1/2	1	1/8	4	12	1 1/4	1/8	4	129 1/2	34
Service 31-1 1/2—1919-20.....	4	4	1 1/4	1 1/4	V	10	2	8	1 1/4	33	1 1/4	F	33	1 1/4	1/8	4	12	1 1/4	1/8	4	121	34
Service 36-1 1/2—1919-20.....	4	4	1 1/4	1 1/4	V	10	2	8	1 1/4	33	1 1/4	F	33	1 1/4	1/8	4	12	1 1/4	1/8	4	121	34
Service 51-2 1/2—1919-20.....	4	4	1 1/4	1 1/4	V	10	2	8	1 1/4	33	1 1/4	F	33	1 1/4	1/8	4	13 1/2	3 1/2	1/8	4	150 1/2	38
Service 71-3 1/2—1919-20.....	4	4	1 1/4	1 1/4	V	10	2	8	1 1/4	33	1 1/4	F	33	1 1/4	1/8	4	16	3 1/2	1/8	4	145 1/2	38
Service 76-3 1/2—1919-20.....	4	4	1 1/4	1 1/4	V	10	2	10	1 1/4	38 1/2	1 1/4	F	38 1/2	1 1/4	1/8	4	16	3 1/2	1/8	4	145 1/2	38
Service 101-5—1919-20.....	4	4	1 1/4	1 1/4	V	10	2	10	1 1/4	38 1/2	1 1/4	F	38 1/2	1 1/4	1/8	4	16	3 1/2	1/8	4	145 1/2	38
Signal NF-1.....	4	4	1 1/4	1 1/4	V	7 1/4	1 1/4	12	1 1/4	39 1/2	1 1/4	F	39 1/2	1 1/4	1/8	4	11	3	1/8	4	120	34
Signal H 1 1/2.....	3	4	1 1/4	1 1/4	V	10	1 1/4	9	1 1/4	30 1/2	1 1/4	F	30 1/2	1 1/4	1/8	4	12	3 1/4	1/8	4	120	34
Signal J-2 1/2.....	3	4	1 1/4	1 1/4	V	10	1 1/4	12	1 1/4	30 1/2	1 1/4	F	30 1/2	1 1/4	1/8	4	12	3 1/4	1/8	4	126	34
Signal M 3 1/2.....	3	4	1 1/4	1 1/4	V	5 1/2	1 1/4	12	1 1/4	34 1/2	1 1/4	F	34 1/2	1 1/4	1/8	4	13	3 1/2	1/8	4	168	38
Signal R-5.....	3	4	1 1/4	1 1/4	V	8	2	16	2	41	2	F	41	2	1/8	4	18	4	1/8	4	172	38
Standard I-K-1-1 1/2.....	3	4	1 1/4	1 1/4	V	10 1/2	2 1/2	13 1/2	2 1/2	39 1/2	1 1/4	F	39 1/2	1 1/4	1/8	4	10 3/4	3	1/8	4	120	32
Standard 76-2 1/2-3.....	3	4	1 1/4	1 1/4	V	12	1 1/4	18	1 1/4	31 1/2	1 1/4	F	31 1/2	1 1/4	1/8	4	13	3 1/4	1/8	4	122	32
Standard 66-3 1/2-4.....	3	4	1 1/4	1 1/4	V	12	1 1/4	18	1 1/4	36 1/2	1 1/4	F	36 1/2	1 1/4	1/8	4	15 1/2	3 1/2	1/8	4	144	38
Standard 5K-5-7.....	3	4	1 1/4	1 1/4	V	8	2 1/2	3 1/2	2 1/2	42 1/2	2	F	42 1/2	2	1/8	4	17 1/2	4	1/8	4	144	38
Sterling 1 1/2—1920-21.....	3	4	1 1/4	1 1/4	V	11	1 1/2	19	1 1/2	38	1 1/2	F	38	1 1/2	1/8	4	11	3 1/4	1/8	4	120	33 1/2
Sterling 2—1920-21.....	3	4	1 1/4	1 1/4	V	11	1 1/2	19	1 1/2	38	1 1/2	F	38	1 1/2	1/8	4	13	3 1/4	1/8	4	120	33 1/2
Sterling 2 1/2—1920-21.....	3	4	1 1/4	1 1/4	V	11	1 1/2	19	1 1/2	38	1 1/2	F	38	1 1/2	1/8	4	13 1/2	3 1/2	1/8	4	138	34
Sterling 3 1/2—1920-21.....	3	4	1 1/4	1 1/4	V	14 1/2	1 1/2	22	1 1/2	40 1/2	1 1/2	F	40 1/2	1 1/2	1/8	4	15 1/2	3 1/2	1/8	4	144	38
Sterling 5-Worm—1920-21.....	3	4	1 1/4	1 1/4	V	11	1 1/2	19	1 1/2	40 1/2	1 1/2	F	40 1/2	1 1/2	1/8	4	17 1/2	4	1/8	4	158	38
Sterling 5-Chain—1920-21.....	3	4	1 1/4	1 1/4	V	11	1 1/2	19	1 1/2	40 1/2	1 1/2	F	40 1/2	1 1/2	1/8	4	17 1/2	4	1/8	4	158	38
Sterling 7 1/2—1920-21.....</																						

Replacement Table—Continued

Name, Model and Tonnage	ENGINE										BRAKE LINING								FRAME			
	Piston Rings		Carburetor		Upper Hose		Lower Hose		Fan Belt		Service				Emergency				Length	Width		
	No. per Cyl.	Width	Outlet Diameter	Inlet Diameter	Vertical or Horizontal	Length	Width	Length	Width	Length	Width	Type	Length	Width	Thickness	No. of Pieces	Length	Width	Thickness	No. of Pieces	Back of Driver's Seat	Over All
Union FW-2½	3	1½	1½	1½	V	20	1¾	19½	1½	37¾	2	F	26	4½	¼	1	52	3	¼	1	133½	32
Union H-4	3	1½	1½	1½	V	20	1¾	19½	1½	37¾	2	F	56¾	3½	¼	1	32	4½	¼	1	157½	34
Union HW-4	3	1½	1½	1½	V	20	1¾	19½	1½	37¾	2	F	26	4½	¼	1	24	4½	¼	1	157½	34
Union JW-6	3	1½	2	2	V	20	1¾	19½	1½	41½	2	F	34	4	¼	1	28	5	¼	1	190	36
United 1½	1	1	1	1	H	15	2½	16	1½	37½	2	F	48	2	¼	1	48	1½	¼	1	120	33
United-2½	1	1	1	1	H	7	2½	12	1½	37½	2	F	49	3	¼	1	49	2½	¼	1	Opt	33
United 3½	1	1	1	1	H	7	2½	7	1½	37½	2	F	62	3	¼	1	58	2½	¼	1	Opt	34
United 5	1	1	1	1	H	14½	2½	12	1½	37½	2	F	88½	2½	¼	1	88½	2½	¼	1	Opt	38
U.S.N.-1½	3	¾	1½	1½	V	11½	2	9	1½	37	1½	F	50½	2½	¼	2	46½	1½	¼	2	120	34
U.S.R.-2½-3	3	¾	1½	1½	V	10	1½	10	1½	35	1½	F	21	2½	¼	4	19½	2½	¼	4	144	34
U.S.S.-3½-4	3	¾	1½	1½	V	9	1½	8	1½	37	1½	F	50	2½	¼	4	50	2½	¼	4	156	36
U.S.T.-5-6	4	1	1½	1½	V	15	2	13	1½	38¾	2	F	62	3	¼	4	33	4	¼	1	168	36
Velie 46-1½-1921	3	¾	1	1	V	9½	2½	12½	1½	40	1	F	54½	2½	¼	2	52½	2½	¼	2	120	31
Vim 29-½	3	¾	1	1	V	9	2	12	1½	30¾	1	F	14½	1½	¼	4	14½	1½	¼	4	64	30
Vim 30-½	3	¾	1	1	V	9	2	12	1½	30¾	1	F	14½	1½	¼	4	14½	1½	¼	4	83½	30
Vim 31-1	4	1	1	1	V	9	2	12	1½	40	1	F	18	2	¼	4	18	2	¼	4	92	32
Vim 22-2	4	1	1	1	V	9	2	12	1½	40	1	F	42½	2	¼	2	42½	2	¼	2	120½	34
Vim 23-3	5	1½	1½	1½	V	9	2	12	1½	40	1	F	48½	2½	¼	2	48½	2½	¼	2	160	34
Walker M½													43	2½	¼	2	14	1½	¼	4	90	32
Walker K1													45½	2½	¼	2	16	2	¼	4	96	32
Walker L2													53½	2½	¼	2	19	2	¼	4	120	32
Walker P3½													53½	3	¼	2	19½	2½	¼	4	140	35
Walker N5													53½	3	¼	2	19½	2½	¼	4	162	35
Walker-Johnson B3	4	1½	1½	1½	V	10	2	8	1½	33½	1½	F	13	3½	¼	4	13	3½	¼	4	133	32
Walter S-5	3	¾	1½	1½	V	10	1½	18	1½	39	1½	F	15	5	¼	4	57	2½	¼	2	150	36
Ward LaFrance 2B-2½-3-1920	3	¾	1½	1½	V	7	1½	16	1½	41½	1½	F	13	3½	¼	4	13	3½	¼	4	137½	33
Ward LaFrance 4A-3½-4-1920	3	¾	1½	1½	V	8½	1½	18	1½	41½	1½	F	15½	3½	¼	4	15½	3½	¼	4	170	37
Ward LaFrance 5A-5-6-1920	3	¾	1½	1½	V	9½	1½	18	1½	41½	1½	F	18	4	¼	4	18	4	¼	4	170	37
Watson B1	4	1	1½	1½	V	16½	1	4	1½	40	1½	F	41	1½	¼	2	41	1½	¼	2	90	30
Watson N-3½	3	¾	1½	1½	V	16½	1	3	1½	34	1½	F	62	2½	¼	2	47	2½	¼	2	147	37
Watson U-5	3	¾	1½	1½	V	16½	1	3	1½	38½	1½	F	15½	3½	¼	4	15½	3½	¼	4	150	36
White Hickory H-1½-1919	3	¾	1½	1½	V	11	2	8	1½	41	1½	F	13½	3½	¼	4	13½	3½	¼	4	116½	32
White Hickory H-1½-1920	3	¾	1½	1½	V	11	2	8	1½	41	1½	F	11½	3½	¼	4	11½	3½	¼	4	116½	32
White Hickory E-1-1920	3	¾	1½	1½	V	11	2	8	1½	41	1½	V	11	3	¼	4	11	3	¼	4	92½	32½
White Hickory K-2½-1920	3	¾	1½	1½	V	9	1½	8	1½	33½	1½	F	13½	3½	¼	4	13½	3½	¼	4	150	32
Wichita K-1-1915-20-21-22	3	¾	1½	1½	V	18½	1	12	1½	52½	1½	F	19½	2	¼	4	19½	2	¼	4	127½	30
Wichita M-2-1915-20-21-22	3	¾	1½	1½	V	18½	1	12	1½	52½	1½	F	49	2	¼	4	49	2	¼	4	126½	30
Wichita RX-2½-1919-20-21-22	3	¾	1½	1½	V	11	1½	11	1½	40	1½	F	54	2½	¼	2	54	2½	¼	2	130	30
Wichita O-3½-1915-20-21-22	3	¾	1½	1½	V	11	1½	11	1½	40	1½	F	56½	2½	¼	2	56½	2½	¼	2	152½	36
Wichita S-5-1919-20-21-22	3	¾	1½	1½	V	11	1½	11	1½	40	1½	F	66	3	¼	2	66	3	¼	2	163½	36
Wilcox AA-1-1920	3	¾	1½	1½	V	11	1½	11	1½	40	1½	F	47½	2½	¼	2	33½	2½	¼	2	96	34
Wilcox B-1½-1920	3	¾	1½	1½	V	11	1½	11	1½	40	1½	F	47½	2½	¼	2	33½	2½	¼	2	132	33
Wilcox C-2½-1920	3	¾	1½	1½	V	11	1½	11	1½	40	1½	F	57½	2½	¼	2	42½	2½	¼	2	141	33
Wilcox E-3½-1920	3	¾	1½	1½	V	11	1½	11	1½	40	1½	F	57½	2½	¼	2	42½	2½	¼	2	156	33
Wilcox F-5-1920	4	1	1½	1½	V	11	1½	11	1½	40	1½	F	69½	3½	¼	2	52	3½	¼	2	148½	36
Wilson 1½-1919-20	3	¾	1½	1½	V	11	1½	11	1½	40	1½	F	39½	1½	¼	2	39½	1½	¼	2	120	33
Wilson 2½-1919-20	4	1	1½	1½	V	11	1½	11	1½	40	1½	F	13½	3½	¼	4	13½	3½	¼	4	126	33
Wilson 3½-1919-20	4	1	1½	1½	V	11	1½	11	1½	40	1½	F	16	3½	¼	4	16	3½	¼	4	147	38
Wilson 5-1919-20	4	1	1½	1½	V	11	1½	11	1½	40	1½	F	18	4	¼	4	18	4	¼	4	147	38½
Winther 751-1	3	¾	1½	1½	H	15½	2	17	2	36	1	F	42	2	¼	2	24	2	¼	1	102	30
Winther 39-1½	3	¾	1½	1½	V	10	1½	4½	1½	33½	1½	F	50	2½	¼	2	22½	2½	¼	2	120	30
Winther 430-1½	3	¾	1½	1½	V	11½	1½	11½	1½	30½	1½	F	50	2½	¼	2	22½	2½	¼	2	120	30
Winther 49-2	3	¾	1½	1½	V	11½	1½	6½	1½	37½	1½	F	52	3	¼	2	50	2½	¼	2	144	33
Winther 450-2½	3	¾	1½	1½	V	11½	1½	6½	1½	37½	1½	F	52	3	¼	2	22½	2½	¼	2	120	30
Winther 50-2½	3	¾	1½	1½	V	17½	1½	8	1½	42½	2	F	52	3	¼	2	50	2½	¼	2	58	33
Winther 70-3½	3	¾	1½	1½	V	21½	1½	8	1½	42½	2	F	62	3	¼	2	60	2½	¼	2	156	33
Winther 109-5	3	¾	1½	1½	V	21½	1½	8	1½	42½	2	F	93	2½	¼	2	93	2½	¼	2	156	33
Winther 140-7	3	¾	1½	1½	V	12	1½	6	1½	42½	2	F	93	2½	¼	2	93	2½	¼	2	156	33
Wisconsin 2 (Loganville)	3	¾	1½	1½	H	17	2	17	2	34	1½	F	58	2½	¼	2	56½	2½	¼	2	114	34
Wisconsin 2½ (Loganville)	3	¾	1½	1½	V	12	1½	10	1½	40	1½	V	58	2½	¼	2	56½	2½	¼	2	120	34
Witt Will N-1½-1919-20	3	¾	1½	1½	V	8	1	12	1½	31	1½	F	48	3½	¼	4	48	3½	¼	4	Opt	32
Witt Will P-2-1919-20	4	1	1½	1½	V	8	1	12	1½	31	1½	F	52	3½	¼	4	52	3½	¼	4	Opt	32
Wolverine J 1	4	1	1½	1½	V	9½	1½	11½	1½	42	1½	F	42½	2½	¼	2	38	2½	¼	2	110	34½
Wolverine J 1½	4	1	1½	1½	V	9½	1½	11½	1½	42	1½	F	51	3	¼	2	46	2	¼	2	120	34½
Wolverine J 2	4	1	1½	1½	V	9½	1½	11½	1½	42	1½	F	51	3	¼	2	46	2	¼			

Commercial Car Specifications—Corrected Monthly

The Specifications, Chassis Prices, Etc., Are Corrected Each Month From Data Supplied Direct by the Makers. Gasoline Tractor-Trucks Will be Found at the End of Gasoline Commercial Cars

See Also Replacement Table in "Service and Repair Departments." Truck Frame Dimensions Are Included in Replacement Table

(Where prices are not given it is because we have been unable to get them from authoritative sources)

* An asterisk in front of the model name indicates that corrections have been made somewhere in the specifications since the previous month

Trade Name and Model	Chassis Price	ENGINE DETAILS										GEARSET		REAR AXLE		Steering Gear (Make)	TIRES, WHEELS, RIMS		Chassis Weight	Wheelbase	P. Cent of Weight on Rear Wheels															
		Make and Model	Bore and Stroke	N. A. C. C.	Horsepower	Valve Arrangement	How Cooled	Radiator (Make)	Radiator (Type)	Lubrication	Carburetor	Fuel Feed	Governor (Make)	Clutch (Make)	Clutch (Type)		Ignition System	Engine Starter				Make	Location	Speeds	Universal (Make)	Springs (Make)	Final Drive	Make	Type	Total Gear Reduction in High	Total Gear Reduction in Low	Front	Rear	Wheels (Make)	Rim Equipment	
1000 Pounds																																				
*Dodge Brothers.....	885	Own	3 1/2 x 5 1/4	24	L	C	McC	PT	FS	Stew	V	...	...	Own	DD	DD	W	NE	Own	Own	U	3	MM	...	...	Own	4.1	19.4	32x4	32x4	Kel	Kel	2224	114	66.5	
*Dort.....	685	Own	3 1/2 x 5 1/4	24	L	C	McC	PT	FS	Stew	V	...	...	Own	DD	DD	W	NE	Own	Own	U	3	MM	...	...	Own	4.1	15.13	32x4	32x4	Imp	Imp	2015	105	...	
*Vim 20.....	1050	Own	3 1/2 x 5 1/4	24	L	C	McC	PT	FS	Stew	V	...	...	Own	DD	DD	W	NE	Own	Own	U	3	MM	...	...	Own	4.1	15.13	32x4	32x4	Hoo	Hoo	2175	108	...	
*Vim 30.....	1175	Own	3 1/2 x 5 1/4	24	L	C	McC	PT	FS	Stew	V	...	...	Own	DD	DD	W	NE	Own	Own	U	3	MM	...	...	Own	4.1	15.13	32x4 1/2	32x4 1/2	Hoo	Hoo	2280	127	...	
1500 Pounds																																				
*Aason Fast.....	...	Own	3 1/2 x 5	22.5	L	C	GO	C	F	Shel	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3080	142	...
*Aome G.....	...	Own	3 1/2 x 5	22.5	L	C	GO	C	F	Shel	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3050	129	50
*Brookway E.....	...	Own	3 1/2 x 5	22.5	L	C	GO	C	F	Shel	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3450	135	70
*Clydesdale G.....	745	Own	3 1/2 x 5 1/4	21.7	H	C	Har	PT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2167	120	...
*Garford 15.....	1890	Own	3 1/2 x 5 1/4	21	L	C	Har	PT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3200	136	64
*H. R. L.....	2200	Own	3 1/2 x 5 1/4	21	L	C	Har	PT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3500	132	...
*Internat'l Speed Truck S.....	1600	Own	3 1/2 x 5 1/4	19.6	L	C	Har	PT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3300	134	...
*Kearns 4.....	1500	Own	3 1/2 x 5 1/4	19.6	L	C	Har	PT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2800	118	65
*Napoleon 7.....	1350	Own	3 1/2 x 5 1/4	19.6	L	C	Har	PT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2600	123	...
*Rainier R11.....	1950	Own	3 1/2 x 5 1/4	19.6	L	C	Har	PT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3000	138	...
*Republic 75.....	1250	Own	3 1/2 x 5 1/4	21.8	H	C	Har	PT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2700	123	...
*Sanson 15.....	1195	Own	3 1/2 x 5 1/4	16.9	H	C	Har	PT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2400	117	65
*Service 12.....	1240	Own	3 1/2 x 5 1/4	16.9	H	C	Har	PT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2800	121	...
*Stewart 14.....	1195	Own	3 1/2 x 5 1/4	16.9	H	C	Har	PT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2350	125	80
*Stoughton C.....	1795	Own	3 1/2 x 5 1/4	16.9	L	C	Har	PT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2650	124	...
*Triangle A.....	2400	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3000	128	...
*Watson B.....	1795	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2700	123	70
*White 15.....	2400	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2480	131	...
*Yellow Cab M-22-3/4.....	1590	Own	3 1/2 x 5	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2600	116	60
1 Ton																																				
*Aason R.....	...	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3650	142	...
*Aome B.....	1450	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3406	129	50
*Apex G.....	1750	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2450	130	70
*Armstrong 20.....	1185	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2650	130	70
*Atlas Merchant's Dispatch.....	1495	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2800	129	65
*Avery.....	1395	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2500	126	65
*Bell M.....	1285	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2500	126	65
*Belmont G.....	1285	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2500	126	65
*Birch 1.....	1225	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2500	126	65
*Chevrolet T.....	2385	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3000	132	...
*Clydesdale 20.....	1400	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3200	132	...
*Collier 18.....	1600	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3500	136	67
*Corbett H-22.....	1800	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3210	140	70
*Day Elder AS.....	1600	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3100	130	75
*Deaeron E (Speed).....	1695	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3200	128	...
*Defiance G.....	1485	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3280	133	65
*Denby 31.....	1750	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2700	128	...
*Dempable Dispatch A.....	1185	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2840	130	73
*Diehl A.....	1800	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	4000	134	75
*Earl 40.....	4300	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	2400	115	90
*Federal SD.....	1800	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3600	122	65
*Ford T.....	1750	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3800	124	...
*Fowler A.....	1750	Own	3 1/2 x 5 1/4	22.5	L	C	GO	ZZT	FS	Stew	V	...	...	Own	DD	DD	W	GRE	Own	Full	U	3	Bld	Det	...	...	Own	6.25	25	34x5	34x5	...	...	3600	120	66

[illegible]

Trade Name and Model	Chassis Price	ENGINE DETAILS										GEARSET				REAR AXLE		TIRES, WHEELS, RIMS		Chassis Weight	P.R. Cent of Weight on Rear Wheels													
		Bore and Stroke	N. A. C. C.	Horsepower	Valve Arrangement	How Cooled	Radiator (Make)	Radiator (Type)	Lubrication	Carburetor	Fuel Feed	Governor (Make)	Clutch (Make)	Clutch (Type)	Ignition System	Engine Starter	Make	Location	Speeds			Universal (Make)	Springs (Make)	Final Drive	Make	Type	Total Gear Ratio	Total Gear Ratio in Low	Steering Gear	Front	Rear	Wheels (Make)	Rim Equipment	Wheelbase
1 1/2 Ton—Con'd																																		
D-Olt AA	2850	3 1/2 x 5	19.5	19.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x4	34x5	Own	...	5300	168.70
Douglas G-1 1/2	1750	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Torb	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Douglas G-1 1/2	1750	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Torb	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Erie E-1 1/2	2175	3 1/2 x 5	27.2	27.2	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	36x5	36x5	Own	...	4260	144.65
Federal T-1	2175	3 1/2 x 5	27.2	27.2	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	36x5	36x5	Own	...	4260	144.65
Forscher C	2800	3 1/2 x 5	27.2	27.2	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	36x5	36x5	Own	...	4260	144.65
Front Drive C	2800	3 1/2 x 5	27.2	27.2	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	36x5	36x5	Own	...	4260	144.65
Graham Bros.	1430	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Graham Pioneer 15	1900	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Graham Pioneer 65	2950	3 1/2 x 5	27.2	27.2	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	36x5	36x5	Own	...	4260	144.65
Gramm-Pioneer 65	2950	3 1/2 x 5	27.2	27.2	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	36x5	36x5	Own	...	4260	144.65
G. W. Farm Spec.	2600	3 1/2 x 5	27.2	27.2	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	36x5	36x5	Own	...	4260	144.65
H. K. R.	3250	3 1/2 x 5	27.2	27.2	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	36x5	36x5	Own	...	4260	144.65
Hurburt	2040	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Huron-Erie	2040	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Independent G (Iowa)	2040	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Independent F (Ohio)	2040	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Indiana 12	2585	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
International 31	1850	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Kalamazoo G-1	2495	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Kalamazoo G	2495	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Kalamazoo G-1	2495	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Kearns 1 1/2	2800	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Kelly-Springfield K31	2900	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Kelly-Springfield K34	2900	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Kiesel General Utility	1975	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Kleiber A	1995	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Koehler D	2400	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Larabee-Deyo U	2400	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Luedinghaus W	2490	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Macar L	2700	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Maek AB 1 1/2	3000	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Maek AB 1 1/2	3000	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Master JW	2690	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Maxwell	2475	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Menominee H	1895	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Moline 10	2800	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Moreland 21 B	1860	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V	Opt	B-B	DP	Eis	...	...	Timk	U	4	Spic	SP	W	W	1/2 FI	8.25	23.1	Ros	34x5	34x5	Own	...	3725	126.65
Napoleon 11	2100	3 1/2 x 5	22.5	22.5	L	GO	Own	PT	Zen	V																								

!Choices only

Trade Name and Model	Chassis Price	ENGINE DETAILS										GEARSET			REAR AXLE			TIRES, WHEELS, RIMS			Chassis Weight	Wheelbase	Pr. Cent of Wheelbase on Rear Wheels									
		Make and Model	Bore and Stroke	N. A. C. C.	Valve Arrangement	How Cooled	Radiator (Make)	Radiator (Type)	Lubrication	Carburetor	Fuel Feed	Governor (Make)	Clutch (Make)	Clutch (Type)	Ignition System	Engine Starter	Make	Location	Speeds	Universal (Make)				Springs (Make)	Final Drive	Make	Type	Total Gear Reduction in High	Total Gear Reduction in Low	Steering Gear (Make)	TIRES, WHEELS, RIMS	
																															Front	Rear
2 Ton—Cont'd																																
Stoughton D.	2800	Her CU3	4 1/2 x 5 1/2	26.6 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Superior E.	2600	Cont CU3	4 1/2 x 5 1/2	27.2 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Titan 2.	2950	Cont N4	4 1/2 x 5 1/2	26.6 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Traffic 4000C.	1695	Buda HTU	4 1/2 x 5 1/2	22.6 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Triangle C.	2850	Wau HTX	4 1/2 x 5 1/2	22.6 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Triumph 2	2550	Buda HTU	4 1/2 x 5 1/2	22.6 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Ultimate AJ.	3250	Buda HTU	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Ultimate AJL.	3300	Buda HTU	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Walter 20.	3150	Her C2	4 1/2 x 5 1/2	22.6 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
White 20.	3750	Own FV	4 1/2 x 5 1/2	22.6 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Wichita M.	3250	Wau BX	4 1/2 x 5 1/2	22.6 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Wichita M.	3250	Wau BX	4 1/2 x 5 1/2	22.6 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Wisconsin (Loganville).	1700	GBS	4 1/2 x 5 1/2	22.6 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Witt Will P.	2750	Cont C4	4 1/2 x 5 1/2	22.6 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Wolverine J2.	2640	Cont J4	4 1/2 x 5 1/2	22.6 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Young 6.	2750	Cont K-4	4 1/2 x 5 1/2	22.6 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
2 1/2 Ton																																
Aceson H.	3350	Wau CU	4 1/2 x 5 1/2	30.6 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Ace 2 1/2.	3350	Cont LA	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
American.	2695	Wau HTU	4 1/2 x 5 1/2	26.6 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Apex E.	3275	Buda HTU	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Armstrong HW.	3160	Cont C4	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Armstrong HW.	3160	Cont C4	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Atco A.	3275	Buda HTU	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Atterbury 7CX LWB.	3160	Cont C4	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Atterbury 7CX STD.	3160	Cont C4	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Available 2 1/2.	3160	Cont C4	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Bell O.	2550	Buda HTU	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Besemer J2.	2550	Cont C4	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Bridgeport 2 1/2 B.	2850	Cont C4	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Brinton D.	2250	Cont C4	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Brockway K.	3700	Wau HTU	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Capitol K2 1/2.	4280	Wau HTU	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Capitol K2 1/2.	4280	Wau HTU	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Chicago 62 1/2 X.	3450	Cont C4	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Chicago 62 1/2 X.	3450	Cont C4	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Collins 22.	2355	Cont C4	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Commer 18.	2495	Cont C4	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Concord B.	3600	Buda HTU	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Corbett B-22.	3000	Cont C4	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy	4600	144 70
Dart M.	2750	Buda HTU	4 1/2 x 5 1/2	28.9 L	L	CA	Own	Fin	Strm	Strm	G V	Dup	B-Li	DD	Eis	W	Shel	U	4	Ther	Shel	W	Shel	1/2 Fl	66	35	36x4	36x7	Bim	Gdy		

‡ Chaos Only

Trade Name and Model	Chassis Price	ENGINE DETAILS										GEARSET				REAR AXLE		Tires, Wheels, Rims				Chassis Weight	Wheelbase	Pr. Cent of Weights on Rear of Wheels																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
		Make and Model	N.A.C.C. Horsepower	Valve Arrangement	How Cooled	Radiator (Make)	Radiator (Type)	Lubrication	Carburetor	Fuel Feed	Governor (Make)	Clutch (Make)	Clutch (Type)	Ignition System	Engine Starter	Make	Location	Speeds	Universal (Make)	Springs (Make)	Final Drive				Make	Type	Total Gear Ratio in High	Total Gear Ratio in Low	Steering Gear (Make)	Front		Rear		Wheels (Make)	Rim Equipment																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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Signal M.L.	3675	Cont E4	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	12	58.08	Ros	36x5	40x10	St M	7070 168 78
Standard 66	3775	Cont E4	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Standard 66	3875	Cont E7	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Sterling 3%	3975	Cont E7	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Stewart 10%	4075	Cont E7	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Super Truck 76	4175	Cont E7	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Tiffin 5%	4275	Cont E4	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Titan 3%	4375	Cont E4	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Tower 6 3/4	4475	Cont E4	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Transport 70	4575	Cont E4	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
United C 3%	4675	Cont E4	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
United V 60	4775	Cont E4	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Walter T	4875	Cont E4	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Ward Law France 4A	4975	Cont E4	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
White 40	5075	Cont E4	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
White 40	5175	Cont E4	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
White 40	5275	Cont E4	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Wilson 6	5375	Cont E4	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Wilson 6	5475	Cont E4	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Wither 70	5575	Cont E4	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Wolman E (Suik City)	5675	Cont E4	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Wolman E 3%	5775	Cont E4	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Young 7	5875	Cont E4	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
4 Ton																												
Reserve K2	4275	Win	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Corbin A-22	3495	Cont E7	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Danby 27	3895	Cont E7	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Double-Drive B	3995	Buda YU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Granger 34	5095	Ward HA 200	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Highway-Knight 40	3995	R & V	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	5095	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G	Pier	B-Li	DD	Eis	B-Li	4	Spic	Det	W	Timk	Flot	10	58.08	Ros	36x5	40x10	St M	7070 168 78
Knight 40	3995	Win RAU	4 1/2 x 5 1/2	32.4	L	GO	Fin	FS	Strm	G																		

Trade Name and Model	Chassis Price	ENGINE DETAILS										GEARSET				REAR AXLE			TIRES, WHEELS, RIMS			Chassis Weight	Wholesale Fr. Cent of Weight on Rear Wheels									
		Make and Model	N. A. C. C.	Bore and Stroke	Horsepower	Valve Arrangement	How Cooled	Radiator (Make)	Radiator (Type)	Lubrication	Carburetor	Fuel Feed	Governor (Make)	Clutch (Make)	Clutch (Type)	Ignition System	Engine Starter	Make	Location	Speeds	Universal (Make)			Springs (Make)	Final Drive	Type	Total Gear Ratio	Total Gear Ratio	Steering Gear	Wheels (Make)		Rim Equipment
																														Front	Rear	
5 Ton—Con'd																																
*Monrovia J.	4850	Wis RAU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	11.6	61.43	Ros	36x6	40x12	Smi	22	23	8250	160 80		
*Moreland 21J.	5000	Cont B2	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	9000	160 80		
*Nelson & LeMoon G5.	5000	Cont B2	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8000	160 80		
*Ogden G.	5000	Wis RAU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8400	160 80		
*Old Reliable D.	5000	Wis RAU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8400	160 80		
*Packard EF.	4850	Wis RAU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8400	160 80		
*Parker 57.	4850	Wis RAU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8400	160 80		
*Pierce Arrow R10.	5100	Wis RAU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8400	160 80		
*Rainer H-17.	5000	Wis RAU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8400	160 80		
*Rowe FW5.	4975	Wis RAU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8400	160 80		
*Sandoz L.	4900	Wis RAU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8400	160 80		
*Sanford W60.	4400	Buda YTU	4 1/2 x 6	32.4	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8200	168 70		
*Schacht.	4900	Buda YTU	4 1/2 x 6	32.4	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	9000	160 70		
*Schwartz DWS.	4900	Buda YTU	4 1/2 x 6	32.4	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	9000	160 70		
*Schwartz DW.	4900	Buda YTU	4 1/2 x 6	32.4	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	9000	160 70		
*Schwartz DWL.	4900	Buda YTU	4 1/2 x 6	32.4	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	9000	160 70		
*Selden 5A.	5000	Buda YTU	4 1/2 x 6	32.4	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	9650	164 56 1/2		
*Service 101.	4400	Buda YU	4 1/2 x 6	32.4	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8760	171 75		
*Signal R.	4400	Cont B2	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	9510	180 80		
*Standard 5K.	4950	Star EU	5 x 6 1/2	40	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8700	160 80		
*Sterling 6-Chain.	4950	Star EU	5 x 6 1/2	40	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	9750	168 94		
*Super Truck 100.	4800	Wia	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	10250	174 94		
*Titan 5.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 6.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 7.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 8.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 9.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 10.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 11.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 12.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 13.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 14.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 15.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 16.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 17.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 18.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 19.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 20.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 21.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 22.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 23.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 24.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros	36x6	40x12	Smi	22	23	8550	168 80		
*Titan 25.	4300	Buda YTU	4 1/2 x 6	36.1	L	L	C	Own	Fin	FS	Strm	G	Mon	Det	DD	Eis	Opt	Cott	A	4	10.4	62.19	Ros</									

ELECTRIC COMMERCIAL CARS

E. C. M.	Name and Model Number	Carrying Capacity	Chassis Weight	Chassis Price	Maximum Speed	Battery	Mileage Per Charge	Motor	Controller	Speeds Forward	Drive	Rear Axle	Springs	Front Tires	Rear Tires	Steering Gear	Wheelbase	Per Cent of Weight on Rear Wheels
	Ward WS 2.....	750	1500	.....	13	Opt	45	G-E	Own	4	W	Shel	Shel	32x3	32x3½	Own	88	60
	C-T BR2B.....	1000	2100	1600	14	Opt	55	G-E	Own	4	C-T	Flot	Shel	36x3	36x3½	W	92	65
	Walker M.....	1000	2300	.....	15	Opt	60	G-E	Own	5	O	Own	Math	34x3	36x3½	Ross	94	66
	Atlantic 1C.....	2000	2770	.....	12	Opt	.....	G-E	G-E	4	C	Timk	S-El	34x4	36x4	Ross	103	65
	Ward WA 2.....	1250	2350	.....	12	Opt	45	G-E	Own	4	W	Shel	Shel	32x3½	34x4	Own	90	60
	Ward WA.....	1250	2730	.....	12	Opt	45	G-E	G-E	4	W	Shel	Shel	32x3½	34x4	Own	90	60
	C-T BR 2.....	2000	2400	2150	14	Opt	60	G-E	Own	4	C-T	Flot	Shel	36x3½	36x4	W	101	60
	C-T BR 2A.....	1500	2200	1975	14	Opt	60	G-E	Own	4	C-T	Flot	Shel	36x3	36x3½	W	91½	60
	Lansden BG ¾.....	.....	1400	1600	15	Opt	50	G-E	G-E	4	R	Flot	.....	32x4½	32x4½	Lav	90	50
	Lansden MC 1.....	.....	2900	1850	12	Opt	50	G-E	G-E	4	C	Flot	.....	36x3	36x3½	.....	108	60
	Walker K.....	2000	2500	.....	14	Opt	60	G-E	West	5	O	Own	Math	34x3½	36x4	Ross	96	66
	Ward WM.....	2000	2250	.....	12	Opt	45	G-E	Own	4	W	Shel	Shel	32x3	32x4	Own	88	70
	Ward WB.....	2000	3420	.....	10.5	Opt	40	G-E	G-E	4	W	Shel	Shel	34x4	36x5	Own	102	60
	Atlantic 2C.....	4000	3590	.....	11	Opt	.....	G-E	G-E	4	C	Timk	S-El	34x4	36x3½	Ross	115	65
	C-T BR 4.....	4000	4000	2575	12	Opt	60	G-E	Own	4	C-T	Flot	Shel	36x4	36x4½	W	116	60
	Lansden MD 2.....	.....	4400	2250	11	Opt	50	G-E	G-E	4	C	Flot	.....	36x4	36x3½	.....	120	60
	Walker L.....	4000	3700	.....	13	Opt	60	G-E	West	5	O	Own	Math	38x4	38x6	Ross	112	66
	Ward WD.....	4000	4500	.....	9	Opt	35	G-E	G-E	4	W	Shel	Shel	36x6	36x7	Own	114	60
	Atlantic 3C.....	7000	5220	.....	10	Opt	.....	G-E	G-E	5	C	Timk	.....	36x5	40x5½	Ross	135	65
	C-T AR 7.....	7000	5000	3550	10	Opt	50	G-E	Own	4	I	Dead	Shel	36x5	36x5½	W	126	60
	C-T AR 7.....	7000	5800	3850	11	Opt	50	G-E	Own	4	I	Dead	Shel	36x6	36x4½	W	122	55
	Lansden ME 3½.....	.....	5700	2950	10	Opt	45	G-E	G-E	4	C	Flot	.....	36x5	36x4½	.....	133	60
	Ward WF.....	7000	6600	.....	8	Opt	30	G-E	G-E	5	C	Shel	Shel	36x6	36x10	Own	132	70
	Atlantic 5C.....	10000	6230	.....	9	Opt	.....	G-E	G-E	5	C	Timk	S-El	36x6	40x5½	Ross	144	65
	C-T AK 10.....	10000	6500	3960	10	Opt	50	G-E	Own	4	I	Dead	Shel	36x7	36x5½	W	132	55
	Lansden MT 5.....	.....	7500	3350	10	Opt	40	G-E	G-E	4	C	Flot	.....	36x6	36x5½	.....	146	60
	Lansden MG 6.....	.....	8900	.....	7	Opt	35	G-E	G-E	4	R	Flot	.....	36x7	36x6½	.....	156	60
	Walker P.....	7000	5300	.....	11	Opt	50	West	West	5	O	Own	Math	36x5	40x5½	Ross	131	66
	Walker N.....	10000	6300	.....	10	Opt	50	West	West	5	O	Own	Math	36x6	40x6½	Ross	141	66
	Ward WH.....	10000	8200	.....	7	Opt	26	G-E	G-E	5	W	Shel	Shel	36x7	40x12	Own	144	70
	Atlantic 6C.....	13000	6940	.....	8	Opt	.....	G-E	G-E	5	C	Timk	S-El	36x6	40x6	Ross	156	65

Manufacturers and Models Included in Specifications on Preceding Pages

Acason—¾, 1, 1½, 2½, 3½, 5—Acason Motor Truck Co., Detroit Mich.

Ace—1½, 2½—American Motor Truck Co., Newark, Ohio.

Acme—¾, 1, 1½, 2, 2½, 3½, 5—Acme Motor Truck Co., Cadillac, Mich.

Ajax—1½—Ajax Motors Corp., Boston, Mass.

Akron Multi-Truck—1¼—Thomart Motor Truck Co., Kent, Ohio.

American—2½, 4—American Motor Truck & Tractor Co., Portland, Conn.

Apex—1, 1½, 2½, 3½—Hamilton Motor Co., Grand Haven, Mich.

Armleder—1, 1½, 2½, 3½—O. Armleder Co., Cincinnati, Ohio.

Atco—1½, 2½—American Truck & Trailer Corp., Kankakee, Ill.

Atlantic—1, 2, 3, 5, 6—Atlantic Electric Vehicle Co., Newark, N. J.

Atlas—1—Atlas Truck Corp., York, Pa.

Atterbury—1½, 2½, 3½, 5—Atterbury Motor Car Co., Buffalo, N. Y.

Autocar—1½, 2, 5—Autocar Co., Ardmore, Pa.

Available—1½, 2, 2½, 3½, 5, 7—Available Truck Co., Chicago, Ill.

Avery—1—Avery Company, Peoria, Ill.

Bartlett—7—Bartlett Truck Co., Chicago, Ill.

Bell—1, 1½, 2½—Iowa Motor Truck Co., Ottumwa, Ia.

Belmont—1, 1½, 2, 3—Belmont Motors Corp., Lewistown, Pa.

Bessemer—1, 1½, 2½, 4—Bessemer Motor Truck Co., Grove City, Pa.

Birch—1—Birch Motor Cars, Chicago, Ill.

Bridgeport—1½, 2½, 3½—Bridgeport Motor Truck Co., Bridgeport, Conn.

Brinton—1½, 2½—Brinton Motor Truck Co., Philadelphia, Pa.

Brockway—¾, 1½, 2½, 3½, 5—Brockway Motor Truck Co., Cortland, N. Y.

Buffalo—T T—Buffalo Truck & Tractor Corp., Clarence, N. Y.

C. T.—1, 1½, 2, 3½, 5—Commercial Truck Co., Philadelphia, Pa.

Capitol—1½, 2½, 3½—Capitol Motors Corp., Fall River, Mass.

Case—2—J. I. Case Plow Works Co., Racine, Wis.

Chevrolet—¾, 1—Chevrolet Motor Co. of Mich., Flint, Mich.

Chicago—1½, 2½, 3½, 5—Chicago Motor Truck, Inc., Chicago, Ill.

Climber—1½—Climber Motor Corp., Little Rock, Ark.

Clydesdale—¾, 1, 1½, 2½, 3½, 5—Clydesdale Motor Truck Co., Clyde, Ohio.

Collier—1, 1½, 2, 2½—Collier Motor Truck Co., Bellevue, Ohio.

Columbia—1½, 2½—Columbia Motor Truck & Trailer Co., Pontiac, Mich.

Commerce—1½, 1½, 2, 2½—Commerce Motor Truck Co., Detroit, Mich.

Concord—1½, 2, 2½, 3—Abbott-Downing Truck & Body Co., Concord, N. H.

Corbitt—1, 1½, 2, 2½, 3, 4, 5—Corbitt Motor Truck Co., Henderson, N. C.

Cyclone—1½—The Cyclone Motor Corp., Greenville, S. C.

Dart—1½, 2½, 3½—Dart Truck & Tractor Corp., Waterloo, Ia.

Day-Elder—1, 1½, 2, 2½, 3½, 5—Day-Elder Motors Corp., Newark, N. J.

Dearborn—1, 1½, 2—Dearborn Truck Co., Chicago, Ill.

Defiance—1, 1½, 2—Defiance Motor Truck Co., Defiance, Ohio.

Denby—1, 1½, 2, 3, 4, 5—Denby Motor Truck Co., Detroit, Mich.

Dependable—1, 1½, 2, 2½, 3½—Dependable Truck & Tractor Co., East St. Louis, Ill.

Diamond T—1¼, 1½, 2, 3½, 5—Diamond T Motor Car Co., Chicago, Ill.

Diehl—1, 1½—Diehl Motor Truck Works, Philadelphia, Pa.

Doane—2½, 3½, 6—Doane Motor Truck Co., San Francisco, Cal.

Dodge—1½—Dodge Bros., Detroit, Mich.

D-Olt—1½, 2½, 5—D-Olt Motor Truck Co., Inc., Long Island City, N. Y.

Dorris—2, 3½—Dorris Motor Car Co., St. Louis, Mo.

Dort—½—Dort Motor Car Co., Flint, Mich.

Double Drive—4—Double Drive Truck Co., Chicago, Ill.

Douglas—1½, 2, 3—Douglas Motors Corp., Omaha, Neb.

Drake—2—Drake Motor & Tire Mfg. Corp., Knoxville, Tenn.

Duplex—2, 3½—Duplex Truck Co., Lansing, Mich.

Duty—2—Duty Motor Co., Elgin, Ill.

Eagle—2—Eagle Motor Truck Corp., St. Louis, Mo.

Earl—1—Earl Motors, Inc., Jackson, Mich.

Erie—1½, 2½—Erie Motor Truck Mfg. Co., Erie, Pa.

F. W. D.—3—Four-Wheel Drive Auto Co., Clintonville, Wis.

Facto—2½—Facto Motor Trucks, Springfield, Mass.

Fageol—2, 3, 4, 5—Fageol Motors Co., Oakland, Cal.

Fargo—2—Fargo Motor Truck Co., Chicago, Ill.

Federal—1, 1½, 2, 3½, 5, T.T.—Federal Motor Truck Co., Detroit, Mich.

Ford—1—Ford Motor Co., Highland Park, Mich.

Forschler—1, 1½, 2, 3—Forschler Motor Truck Mfg. Co., New Orleans, La.

Front Drive—1½—Double Drive Truck Co., Chicago, Ill.

Fulton—1, 2, T.T.—Fulton Motors Corp., Farmingdale, N. Y.

G. M. C.—1, 2, 3½, 5—General Motors Truck Co., Pontiac, Mich.

G. W. W.—1½—Wilson Truck Mfg. Co., Henderson, Ia.

Garford—¾, 1½, 2, 3½, 5, 7½—Garford Motor Truck Co., Lima, O.

Gersix—1½, 2½, 3—Gersix Mfg. Co., Seattle, Wash.

Giant—1½, 2½, 3½, 5—Giant Truck Corp., Chicago Heights, Ill.

Graham—1, 1½—Graham Brothers, Evansville, Ind.

Gramm-Bernstein—1, 1½, 2, 3, 3½, 4, 5—Gramm-Bernstein Motor Truck Co., Lima, Ohio.

Hal-Fur—2, 3½—Hal-Fur Motor Truck Co., Cleveland, Ohio.

Hall—2½, 3½, 5, 7—Lewis-Hall Motors Corp., Detroit, Mich.

Harvey—2, 2½, 3½—Harvey Motor Truck Co., Harvey, Ill.

Hendrickson—2½, 3½, 5—Hendrickson Motor Truck Co., Chicago, Ill.

Highway-Knight—4, 5—Highway Truck Corp., Chicago, Ill.

Higrade—1, 1½—Higrade Motors Co., Harbor Springs, Mich.

H. R. L.—¾, 1½, 2½—H. R. L. Motor Co., Seattle, Wash.

Hurlburt—1½, 2½, 3½, 5—Harrisburg Mfg. & Boiler Co., Harrisburg, Pa.

Huron—1½, 2½—Huron Truck Co., Bad Axe, Mich.

Independent—1½, 2½, 3½—Independent Motor Co., Youngstown, Ohio.

Independent—1, 1½, 2½—Independent Motor Truck Co., Inc., Dav-
enport, Ia.

Indiana—1½, 2, 2½, 3½, 5—Indiana Truck Corp., Marion, Ind.

International—1, 1½, 2, 3, 5—International Harvester Co., Chicago, Ill.

Italia—2, 3, 5—Italia Motor Truck Co., San Francisco, Cal.

Jackson—3½—Jackson Motors Corp., Jackson, Mich.

Kalamazoo—1½, 2½, 3½—Kalamazoo Motor Corp., Kalamazoo, Mich.

Kearns—¾, 1½—Kearns-Dughie Motors Co., Danville, Pa.

Kelly-Springfield—1½, 2½, 3½, 5, 6—Kelly-Springfield Motor Truck Co., Springfield, O.

- Keystone—2—Keystone Motor Truck Corp., Philadelphia, Pa.
 Kimball—2, 2½, 3, 4, 5—Kimball Motor Truck Co., Los Angeles, Cal.
 Kissel—1, 1½, 2½, 4, 5—Kissel Motor Car Co., Hartford, Wis.
 Kleiber—1, 1½, 2, 2½, 3½, 5—Kleiber & Co., Inc., San Francisco, Cal.
 Koehler—1½, 2½, 3½, T.T.—H. J. Koehler Motors Corp., Bloomfield, N. J.
 Lange—2, 2½—Lange Motor Truck Co., Pittsburgh, Pa.
 Lansden—¼, 1, 2, 3½, 5, 6—Lansden Company, Danbury, Conn.
 Larrabee-Deyo—1½, 2½, 3½, 5—Larrabee-Deyo Motor Truck Co., Inc., Binghamton, N. Y.
 Lombard—T.T.—Lombard Auto Tractor Truck Corp., New York, N. Y.
 Luedinghaus—1, 1½, 2—Luedinghaus-Espenschied Wagon Co., St. Louis, Mo.
 Luverne—2, 3—Luverne Automobile Co., Luverne, Minn.
 Maccar—1½, 2, 2½, 3½, 5—Maccar Truck Co., Scranton, Pa.
 MacDonald—7—MacDonald Truck & Tractor Co., San Francisco, Cal.
 Mack—1½, 2, 2½, 3½, 5, 6½, 7½, T.T.—International Motor Co., New York, N. Y.
 Master—1½, 2½, 3½, 5, T.T.—Master Trucks, Inc., Chicago, Ill.
 Maxwell—1½—Maxwell Motor Co., Inc., Detroit, Mich.
 Menominee—1, 1½, 2, 3½, 5—Menominee Motor Truck Co., Menominee, Mich.
 Moline—1½—Moline Plow Co., Moline, Ill.
 Moreland—1½, 2, 2½, 4, 5—Moreland Motor Truck Co., Los Angeles, Cal.
 Napoleon—¼, 1, 1½—Napoleon Motors Co., Traverse City, Mich.
 Nash—1, 2—Nash Motors Co., Kenosha, Wis.
 Nelson-LeMoon—1½, 2½, 3½, 5—Nelson & LeMoon, Chicago, Ill.
 Netco—2, 2½—New England Truck Co., Fitchburg, Mass.
 Niles—2—Niles Motor Truck Co., Pittsburgh, Pa.
 Noble—1½, 2, 2½, 3½—Noble Motor Truck Co., Kendallville, Ind.
 Northway—2, 3½—Northway Motors Co., Natick, Mass.
 Norwalk—1, 1½—Norwalk Motor Car Co., Martinburg, W. Va.
 O. K.—1½, 2½, 3½—Oklahoma Auto Mfg. Co., North Muskogee, Okla.
 Ogden—1½, 2½, 3½, 5—Ogden Motor Truck Co., Chicago, Ill.
 Old Reliable—1½, 2½, 3½, 5, 6—Old Reliable Motor Truck Co., Chicago, Ill.
 Oldsmobile—1—Olds Motor Works, Lansing, Mich.
 Olympic—2½—Olympic Motor Truck Co., Tacoma, Wash.
 Oshkosh—2, 2½—Oshkosh Motor Truck Mfg. Co., Oshkosh, Wis.
 Packard—2, 3, 5—Packard Motor Car Co., Detroit, Mich.
 Paige—1½, 2½, 3½—Paige-Detroit Motor Car Co., Detroit, Mich.
 Parker—2, 3½, 5—Parker Motor Truck Co., Milwaukee, Wis.
 Pierce-Arrow—2, 3½, 5—Pierce-Arrow Motor Car Co., Buffalo, N. Y.
 Pioneer—1—Pioneer Truck Co., Chicago, Ill.
 Pittsburgh—2½, 3½—Pittsburgh Truck Mfg. Co., Pittsburgh, Pa.
 Power—1½, 3½—Power Truck & Tractor Co., St. Louis, Mo.
 Premocar—1½—Preston Motors Corp., Birmingham, Ala.
 Rainier—¼, 1, 1½, 2, 2½, 3½, 5—Rainier Motor Corp., Flushing, L. I., N. Y.
 Ranger—2—Southern Motor Mfg. Ass'n, Ltd., Houston, Tex.
 Reliance—1½, 2½—Reliance Motor Truck Co., Appleton, Wis.
 Reo—1½—Reo Motor Car Co., Lansing, Mich.
 Republic—¼, 1, 1½, 2½, 3½—Republic Motor Truck Co., Inc., Alma, Mich.
 Riker—3, 4—Locomobile Co. of America, Bridgeport, Conn.
 Rowe—1½, 2, 3, 4, 5—Rowe Motor Mfg. Co., Lancaster, Pa.
 Ruggles—1½, 2—Ruggles Motor Truck Co., Saginaw, Mich.
 Rumely—1½—Advance-Rumely Thresher Co., Inc., La Porte, Ind.
 Samson—¾, 1½—Samson Tractor Co., Janesville, Wis.
 Sandow—1, 1½, 2, 2½, 3½, 5—Sandow Motor Truck Co., Chicago, Ill.
 Sanford—2½, 3½, 5—Sanford Motor Truck Co., Syracuse, N. Y.
 Schacht—2, 3, 4, 5, 7—G. A. Schacht Motor Truck Co., Cincinnati, O.
 Schwartz—1½, 1½, 2½, 5—Schwartz Motor Truck Co., Reading, Pa.
 Selden—1½, 2½, 3½, 5—Selden Truck Corp., Rochester, N. Y.
 Service—¾, 1½, 1½, 2, 2½, 3½, 5—Service Motor Truck Co., Wabash, Ind.
 Signal—1, 1½, 2½, 3½, 5—Signal Motor Truck Co., Detroit, Mich.
 Southern—1, 1½, 2—Southern Truck & Car Corp., Greenboro, N. C.
 Standard—1½, 2½, 3½, 5—Standard Motor Truck Co., Detroit, Mich.
 Sterling—1½, 2, 2½, 3½, 5—Sterling Motor Truck Co., Milwaukee, Wis.
 Stewart—¾, 1, 1½, 2, 2½, 3½—Stewart Motor Corp., Buffalo, N. Y.
 Stoughton—¾, 1, 1½, 2, 3—Stoughton Wagon Co., Stoughton, Wis.
 Super Truck—2½, 3½, 5—O'Connell Motor Truck Co., Waukegan, Ill.
 Superior—1, 2—Superior Motor Truck Co., Atlanta, Ga.
 Tiffin—1½, 2½, 3½, 5, 6—Tiffin Wagon Co., Tiffin, Ohio.
 Titan—2, 3½, 5, 6—Titan Truck Co., Milwaukee, Wis.
 Tower—1½, 2½, 3½—Tower Motor Truck Co., Greenville, Mich.
 Traffic—1½, 2, 3—Traffic Motor Truck Corp., St. Louis, Mo.
 Transport—1, 1½, 2½, 3½—Transport Truck Co., Mt. Pleasant, Mich.
 Traylor—1½, 2, 3, 4, 5—Traylor Eng. & Mfg. Co., Cornwells, Pa.
 Triangle—¾, 1½, 2, 2½—Triangle Motor Truck Co., St. Johns, Mich.
 Triumph—1½, 2, 2½—Triumph Truck & Tractor Co., Kansas City, Mo.
 Ultimate—1½, 2, 2½, 3, 5—Vreeland Motor Co., Inc., Newark, N. J.
 Union—2½, 4, 6—Union Motor Truck Co., Bay City, Mich.
 United—1½, 2½, 3½, 5—United Motors Co., Grand Rapids, Mich.
 Ursus—1, 1½, 2½, 3½—Ursus Motor Co., Inc., Chicago, Ill.
 U. S.—1½, 3, 4, 5—United States Motor Truck Co., Cincinnati, Ohio.
 Velle—1½—Velle Motors Corp., Moline, Ill.
 Vim—½, 1, 2, 3—Vim Motor Truck Co., Philadelphia, Pa.
 Vulcan—2½—Vulcan Mfg. Co., Seattle, Wash.
 Walker—½, 1, 2, 3½, 5—Walker Vehicle Co., Chicago, Ill.
 Walker-Johnson—2½—Walker-Johnson Truck Co., Woburn, Mass.
 Walter—2, 2½, 3½, 5, 7—T. T. Walter Truck Co., New York, N. Y.
 Ward—¼, 1, 2, 3½, 5—Ward Motor Vehicle Co., Mt. Vernon, N. Y.
 Ward La France—2½, 3½, 5—Ward La France Truck Co., Inc., Elmira, N. Y.
 Watson—¾, 3½, T.T.—Watson Wagon Co., Canastota, N. Y.
 White—¾, 2, 2½, 5—White Co., Cleveland, Ohio.
 White Hickory—1, 1½, 2½—White Hickory Motor Corp., Atlanta, Ga.
 Wichita—1, 2, 3, 3½, 5½—Wichita Falls Motors Co., Wichita Falls, Tex.
 Wilcox—1, 1½, 2½, 3½, 5—Wilcox Trux, Inc., Minneapolis, Minn.
 Wilson—1½, 2½, 3½, 5—J. C. Wilson Co., Detroit, Mich.
 Winther—1, 1½, 2, 2½, 3½, 5, 7—Winther Motor Truck Co., Kenosha, Wis.
 Wisconsin (Loganville)—2, 2½—Wisconsin Truck Co., Loganville, Wis.
 Wisconsin (Sauk City)—1, 1½, 2½, 3½—Wisconsin Farm Tractor Co., Sauk City, Wis.
 Witt-Will—1½, 2—Witt-Will Co., Inc., Washington, D. C.
 Wolverine—1, 1½, 2, 2½, 3½—American Commercial Car Co., Detroit, Mich.
 Yellow Cab—¾, 1½—Yellow Cab Mfg. Co., Chicago, Ill.
 Young—1, 2, 3½—The Young Motor Truck Co., Euclid, Ohio.

Canada Taking Kindly to the Motor Bus

The Toronto Transportation Commission has been wrestling with the rapidly growing need for additional public transit service because of expansion of residential sections of the city. The commission decided in favor of the motor omnibus as an adjunct for the trolley system which was taken over last year from a private corporation, and one of the first steps of the commission was to order seven motor buses of varying types largely for experimental purposes. Four of these were ordered from the Fifth Avenue Coach Co. of New York, one of similar type from the Eastern Canada Motor Truck Co. of Hull, Quebec, and two from England, one a Leyland and the other manufactured by the Associated Equipment Co., London. The latter is the standard type as used in London.

The Toronto Commission also engaged the services of H. E. Blain, C. B. E., assistant managing director of the associated companies controlling the London, England, motor buses and underground lines, as an expert to study and report upon transportation conditions in the Ontario capital.

The authorities at Toronto purchased a four-wheel drive tractor snowplow for use in keeping the bus-line routes open during the winter months and this has proved to be a success. This tractor, which was bought from the Packard-Ontario Motor Co., Toronto, is the type as used in New York by the Fifth Avenue Coach Company. It has a five-speed transmission with a low gear ratio of 80 to 1, it is announced.

Thus, it may be seen that Toronto has become practically the trade battle ground for rival bus interests in the United States, Canada and England. So far, all five types of buses have proved to be very successful.

Bosch Holds Distributor Convention

A most interesting and successful convention of official distributors of the American Bosch Magneto Corp. was held on Jan. 17, 18 and 19 at the company's plant, at Springfield, Mass. It was attended by men from all sections of the country. New and more intensive merchandising constituted the major theme of discussion.

Plans including a very much larger sales and service organization, with a system of training for the cultivation of more efficient merchandisers, was one of the most important accomplishments of the convention.



Distributors Attending Recent Bosch Conference

Analyzing Transportation Costs

We frequently receive requests from dealers for forms showing the manner of arriving at comparative operating costs between horses, gas and electric trucks. The Ward Motor Vehicle Co., Mt. Vernon, N. Y., recently evolved such a cost analysis form, which is displayed in the accompanying column. It tabulates, in a comparatively simple manner, operating costs.

The Ward company maintains that there is logical work for gas trucks and logical work for electric trucks, and under certain conditions there is a logical place for the horse. And, to misapply any of these—to use horses, electrics or gas trucks under wrong conditions or routes will make a vast difference in the operating costs of that particular route, aside from the drivers' salaries. Economy in business, therefore, requires a thorough analysis of all three methods. This analysis form provides a systematic method of procedure.

Some very interesting features concerning horse transportation are brought out by this chart. Many items of expense entailed in the maintenance of a horse delivery system are pointedly brought out in this analysis. In the majority of instances, where there seems to be a pronounced tendency for the horse delivery system in preference to either electric or gas truck transportation, it would develop upon investigation that the owner has failed to take consideration of all items of expense. The truth of the matter really is that he is not fully aware of the existence of these items or that he does not appreciate the fact that the accumulative cost of these items is high.

In this connection it is interesting to note that a certain Western concern after utilizing one of these forms in tabulating its various items of expense, found that it was losing money, and as a result discarded its horse equipment.

December Automotive Exports Show Improvement

Almost every item of the automotive exports for December shows an improvement over November, according to a report of the Automotive Division of the Department of Commerce. Shipments of passenger cars increased more than one-fourth in number and value, while motor trucks increased one-fifth in number and more than one-third in value. Parts of cars and trucks, exclusive of engines and tires, show a slight increase and exports of motor cycles were three-fourths larger than in November. Automotive exports, as a whole, show an increased value of nearly one-fifth over November. Actual figures for December are: Passenger cars complete, 1,784, value \$1,709,264, chassis 862, value \$646,018; motor trucks, complete, 161, value \$178,595, chassis 350, value \$322,191; parts of trucks and cars value \$2,688,850.

First—Figure Your Investment in Delivery Equipment, Buildings, Land, etc.

Horse and Wagon	Gas Truck	Electric Truck
1. COST OF:	1. COST OF:	1. COST OF:
Horses at	Gas Truck Chassis at	Electric Truck Chassis at
Wagons at	Gas Truck Bodies at	Electric Truck Bodies at
Sets of Harness at		
2. COST OF LAND FOR STABLES	2. COST OF LAND FOR GARAGE	2. COST OF LAND FOR GARAGE
3. COST OF STABLE	3. COST OF GARAGE	3. COST OF GARAGE*
4. COST OF EQUIPMENT:	4. COST OF EQUIPMENT:	4. COST OF EQUIPMENT:
Stable Alterations	Garage alterations	Garage alterations
Tools	Tools	Charging Apparatus
Parts	Parts	Wiring
Cleaning Equipment	Cleaning equipment	Tools
		Parts
		Cleaning equipment
TOTAL INVESTMENT	TOTAL INVESTMENT	TOTAL INVESTMENT

Next—Figure Your Yearly Cost of Operation

Horse and Wagon	Gas Truck	Electric Truck
1. FEED OR RENTAL (per year):	1. FUEL OR RENTAL (per year):	1. ENERGY (per year):
Hay	Gasoline	Current
Oats	Oil	Distilled water
Chaff	Or truck rental charge	Solutions
Blas	TOTAL	TOTAL
Salt		
Water		
Or Horse Rental		
TOTAL		
2. LUBRICATION (per year):	2. LUBRICATION (per year):	2. LUBRICATION (per year):
Asic Grease	Oil	Oil
TOTAL	Grease	Grease
	TOTAL	TOTAL
3. CLEANING ITEMS (per year):	3. CLEANING ITEMS (per year):	3. CLEANING ITEMS (per year):
Soap	Soap	Soap
Water	Kerosene	Water
Rags	Water	Rags
Sponges	Rags	Sponges
Harness Oil	Sponges	TOTAL
TOTAL	TOTAL	
4. OTHER EXPENSES (per year):	4. OTHER EXPENSES (per year):	4. OTHER EXPENSES (per year):
Bedding (Straw)	Radiator Mixture	
Kerosene for wagon lamps	Kerosene for Lamp	
TOTAL	TOTAL	
5. REPAIRS AND UPRKEEP (per year):	5. REPAIRS AND UPRKEEP (per year):	5. REPAIRS AND UPRKEEP (per year):
Wagons	Chassis	Chassis
Or wagon rental	Body	Body
Harness	Tires	Battery
Shoeing	Parts	Tires
Veterinary	To building	Parts
To buildings	Or garage rental	To buildings
Or stable rental	TOTAL	Or garage rental
TOTAL		TOTAL
6. INTEREST ON INVESTMENT (per year):	6. INTEREST ON INVESTMENT (per year):	6. INTEREST ON INVESTMENT (per year):
(Figure 3% on total investment.)	(Figure 3% on total investment.)	(Figure 3% on total investment.)
Buildings	Buildings	Buildings
Land	Land	Land
Horses	Vehicles	Vehicles
Wagons	Equipment	Equipment
Equipment	TOTAL	TOTAL
TOTAL		
7. DEPRECIATION (per year):	7. DEPRECIATION (per year):	7. DEPRECIATION (per year):
Stable at 5%	Garage at 5%	Garage at 5%
Horses at 20%	Vehicles at 20 to 33 1/3%	Vehicles at 10%
NOTE: Horse at 20%. The average life of the horse is figured at 5 years, although in New York City the average life is 4 years.	NOTE: The average life of gas trucks in city delivery is less than 3 years. Average life of light delivery cars is still less—some drop, along trade in Florida, every 2 years. We have suggested 30% depreciation on gas trucks, but your experience may make it advisable to figure 25% or more.	NOTE: 10% is a conservative figure on electric truck depreciation. These are electric trucks still running that are 12, 15, 17, 20 and even 24 years old.
Wagons at 10%	Equipment at 10%	Equipment at 5%
Harness at 20%		
Equipment at 10%	TOTAL	TOTAL
TOTAL		
8. INSURANCE (per year):	8. INSURANCE (per year):	8. INSURANCE (per year):
Buildings, horse and wagon and equipment	Buildings, vehicles and equipment	Buildings, vehicles and equipment
Fire	Fire	Fire
Liability	Liability	Liability
Theft	Theft	Theft
TOTAL	TOTAL	TOTAL
9. TAXES (per year):	9. TAXES (per year):	9. TAXES (per year):
Land	Land	Land
Buildings	Buildings	Buildings
TOTAL	TOTAL	TOTAL
10. LICENSE (per year)	10. LICENSE (per year)	10. LICENSE (per year)
11. MISCELLANEOUS CHARGES	11. MISCELLANEOUS CHARGES	11. MISCELLANEOUS CHARGES
Salaries of drivers	Salaries of drivers	Salaries of drivers
Salaries of stablemen	Salaries to garage-men	Salaries to garage-men
Painting	Painting	Painting
TOTAL	TOTAL	TOTAL
GRAND TOTAL	GRAND TOTAL	GRAND TOTAL
Multiply by 10	Multiply by 10	Multiply by 10
Ten Year Cost	Ten Year Cost	Ten Year Cost

Majestic Tire & Rubber Co., Indianapolis, Ind.	26.35	37.65	39.35	42.55	44.70	53.00	.....	53.00	91.85	2200	90	.....	.....	.....	.....	.....	.....
Majestic Cord, non-skid																	
Marathon Tire & Rubber Co., Cuyahoga Falls, O.	19.90	32.40	34.25	41.90	43.90	52.15	.....	54.75	82.65	2200	90	.....	.....	.....	.....	.....	.....
Marathon Cord, non-skid																	
Mason Tire & Rubber Co., Kent, O.	18.75	31.95	33.05	40.05	42.25	50.80	.....	52.60	80.40	22.00	90	110.40	3000	100	142.20	4000	110
Mason Cord, non-skid																	
Mellinger Tire & Rubber Co., Kansas City, Mo.	19.70	34.95	37.85	44.45	46.55	54.90	.....	56.50	103.10	2200	90	.....	.....	.....	.....	.....	.....
Mellinger Cord, non-skid																	
Michelin Tire Co., Milltown, N. J.	19.50	35.10	37.50	47.50	49.50	60.20	.....	61.50	86.00	2200	90	.....	.....	.....	.....	.....	.....
Michelin Cord, non-skid																	
Mid-Continent Tire Mfg. Co., Wichita, Kans.	22.00	38.75	41.15	45.45	47.50	56.30	.....	59.00	92.50	2200	90	.....	.....	.....	.....	.....	.....
Midco Cord, Universal																	
Miller Rubber Co., Akron, O.	18.00	32.40	34.25	41.90	49.05	52.15	.....	56.05	61.00	78.05	2200	100	113.85	3000	110	146.65	4000
Miller Cord, "Gearing-to-the-Road"																	
Mohawk Rubber Co., Akron, O.	26.50	34.10	36.10	44.10	46.20	55.00	.....	56.50	87.00	2200	90	121.50	3000	100	156.50	4000	110
Mohawk Cord, non-skid																	
Oldfield Tire Co., Akron, O.	18.45	33.20	35.00	42.95	45.00	53.45	.....	56.10	84.75	2200	90	.....	.....	.....	.....	.....	.....
Oldfield Cord, anti-skid																	
Pennsylvania Rubber Co., Jeannette, Pa.	23.75	32.50	34.50	41.90	43.95	52.20	.....	53.95	84.95	2200	90	105.95	3000	100	149.95	4000	110
Pennsylvania Cord, non-skid																	
Perfection Tire & Rubber Co., Fort Madison, Ia.	19.60	32.40	34.25	41.90	43.90	52.15	.....	54.75	90.90	2200	90	121.50	3000	100	157.50	4000	110
Perfection Cord, non-skid																	
Powertown Tire Corp., Rochester, N. Y.	23.30	39.10	41.00	49.70	53.10	61.00	.....	63.20	95.90	2200	90	.....	.....	.....	.....	.....	.....
Powertown Cord, non-skid																	
Quaker City Rubber Co., Philadelphia, Pa.	23.75	32.50	34.50	45.00	47.50	53.50	.....	56.25	85.00	2200	90	115.50	3000	100	.....	.....	.....
Quaker City Cord, non-skid																	
Racine Rubber Co., Racine, Wis.	18.00	32.40	34.25	41.90	43.90	52.15	.....	54.75	78.55	2200	90	113.85	3000	100	146.65	4000	110
Racine Multi-Mile Cord																	
Republic Rubber Co., Youngstown, O.	18.30	32.50	34.50	42.70	44.85	53.20	.....	55.85	82.65	2200	90	115.45	3000	100	148.70	4000	110
Republic Cord, non-skid																	
Samson Tire & Rubber Corp., Los Angeles, Calif.	27.50	37.60	39.90	49.40	52.60	61.50	.....	63.80	85.00	2200	90	.....	.....	.....	.....	.....	.....
Samson Super Size Cord, non-skid																	
Sprague Tire & Rubber Co., Omaha, Neb.	.....	32.50	34.50	41.90	44.30	.....	.....	.....	90.90	2200	90	.....	.....	.....	.....	.....	.....
Sprague Cord, non-skid																	
Spreckles "Savage" Tire Co., San Diego, Cal.	.....	35.50	37.80	46.80	48.00	57.40	.....	60.00	90.00	2200	90	.....	.....	.....	.....	.....	.....
Spreckles Savage Cord																	
Standard Four Tire Co., Keokuk, Iowa	.....	32.50	34.50	42.70	44.85	53.20	.....	55.85	85.00	2200	90	.....	.....	.....	.....	.....	.....
Standard Cord, non-skid																	
Standard Tire Co., Willoughby, O.	18.00	32.40	34.25	41.90	43.90	52.15	.....	54.75	82.65	2200	90	115.45	3000	100	.....	.....	.....
Tiger Foot, non-skid																	
Swinehart Tire & Rubber Co., Akron, O.	20.00	35.20	37.25	45.55	47.70	56.70	.....	59.40	59.50	2200	90	115.65	3000	100	.....	.....	.....
Swinehart Cord, non-skid																	
Syracuse Rubber Co., Inc., Syracuse, N. Y.	18.30	32.50	34.50	42.45	44.50	52.85	.....	55.50	78.55	2200	90	113.85	3000	100	146.65	4000	110
Syracuse Syra-Cord, non-skid																	
Thermold Rubber Co., Trenton, N. J.	.....	36.80	39.45	42.65	44.55	52.95	.....	54.60	84.15	2200	90	118.80	3000	100	.....	.....	.....
Thermold cord, non-skid																	
Traveler Rub. Co. of Bethlehem, Bethlehem, Pa.	19.60	32.40	34.25	41.90	43.90	52.15	.....	54.75	83.60	2200	90	.....	.....	.....	.....	.....	.....
Traveler Cord, non-skid																	
United States Tire Co., New York, N. Y.	.....	.....	.....	.....	.....	.....	.....	.....	78.55	2200	90	113.85	3000	100	146.65	4000	110
United States Cord, non-skid																	
Victor Rubber Co., Springfield, Ohio.	19.00	34.10	36.05	41.90	43.90	52.15	.....	54.10	58.90	2200	90	.....	.....	.....	.....	.....	.....
Victor Cord, non-skid																	

See Big Future for Gasoline Rail Bus

Norwalk, Ohio, Feb. 4, 1922.

To the Editor:

In line with your inquiry under date of January 30th, beg to advise that I do not think that the motor bus will solve the problems now confronting the electric railway field.

The writer has had twenty-seven years' experience in the electric railway field and for the past ten years has represented the United States District Court as a receiver of bankrupt electric railways, and the court records will show that I made application for gasoline equipment in 1913 and, as early as 1911. I mention this in order to show you that I have gone into this matter for a number of years and have made a study of same.

Now the gasoline bus, and I take the word "bus" as it applies to the rubber-tired vehicle, is not the proper solution of the main problem before the electric railway field, but the gasoline rail coach is the only salvation for said railways, and I will try and give you figures to prove my statements, and while there has been gasoline rail cars on the market for a number of years, they have not solved the problem for the electric railways, for the simple reason that the theory was wrong. * * *

Now let us take a motor bus, with a light steel body, and a 50 h.p. motor, remove the rubber tire wheels and put on flange wheels, and you have a gasoline rail coach that will answer the purpose of the electric railways and the body can be built for either city or interurban work, viz., a 22-passenger body, with a 25 h.p. motor will take care of the small city railways, while a 40-passenger body, with a 40 to 50 h.p. motor will take care of the large city and interurban business. * * *

I am not going to boost for any particular car, and, therefore, will omit the names of the manufacturer, but I have in mind a railway in a certain central state which was operating 35 miles of track and changed over to the gasoline coach and the first year showed a gain of \$45,000 in their net receipts, and further they saved \$17,280 in power cost alone.

On the average short-line railway, either steam or electric, there can be a saving in the cost of operation from 15 to 25 cents per mile; that is a great saving when you consider that the 35-mile railway above mentioned operated over 200,000 miles per annum, and the average electric railway is operating at or about 40 cents per mile, while the gasoline coach can be operated at 16 cents per mile.

The coming field for the gasoline truck and automobile companies is the electric railway field, and the gasoline coach will replace all electrics within ten years' time, the cost of operation is even cheaper than the bus which operates in congested traffic, over rough pavements, and, therefore, has a greater expense than the rail coach.

This is not a **knock** on the bus, but merely a new way of using the bus, viz., on a rail, instead of on rubber tires.

O. G. TAYLOR,
Receiver.

The Sandusky, Norwalk &
Mansfield Elec. Ry.

Activities of the Motor Truck Association of Philadelphia

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THE COMMERCIAL CAR JOURNAL OFFICIAL ORGAN

FIRE prevention, Shakespearean salesmanship and business optimism for 1922, were three subjects presented in an absorbingly interesting manner to 150 members and guests of the Motor Truck Association of Philadelphia at their monthly meeting, January 18, at the Hotel Adelphia. All were treated by experts on the respective topics in such a manner that everyone present voted the meeting one of the best held by the association within the past year.

The attendance was also considerably above the average, showing that the motor truck men, like the passenger car dealers, have apparently taken a new lease on business life and expect to put things over during the coming year in big style.

W. H. Metcalf acted as temporary president. Mr. Metcalf reported that the special committee appointed to call a meeting of the sales managers to consider the used truck problem, had taken steps toward that end. He also announced that the association had made a contract with an organization to prevent theft.

Thomas K. Quirk, the newly elected president, was inducted into office and conducted the balance of the meeting.

George Elliott, city fire marshal, then gave a most interesting talk on fire prevention, stating that heretofore municipal and town authorities, particularly in this country, devoted the principal part of their efforts and expenditures to fire suppression, rather than to fire prevention. Among other things, he said: "Fire prevention is an outstanding problem in the United States today, which country suffers from the greatest fire losses of any country in the world, averaging about \$1,000,000. This sum of money would be more than enough to build all the good roads in the United States, would pay the interest on the national debt, and would reduce materially the actual cost of living to every citizen in the country."

"There is an absence of adequate laws to punish carelessness or deliberate starting of fires to destroy property. In Europe a man can be punished unless he can prove that the fire was not his fault. Many fires here are due to

wilful arson. In no state in the Union, except two, is there an adequate law against this crime. There are 5,000 fires a year in Philadelphia, and 15,000 in Chicago, many of which are preventable. There are some 5,700 causes of fire, 65 per cent of which could be under control of the owners. From the standpoint of economy alone, not to speak of the 1,500 lives lost yearly by fires in this country, the authorities should take steps to put in force laws that would make two-thirds of these fires impossible."

H. E. Roesch, of Whitehead & Hoag Co., Newark, N. J., gave a scholarly presentation of Shakespeare as a salesman, using Mark Anthony's speech over Caesar's body as an example of selling the psychological idea to a mob.

E. J. Cattel, city statistician, gave one of his characteristically optimistic talks. Howard Armstrong, who leads the music for the association, got the audience in a happy frame of mind before the speech-making began and gave a delightful rendition of "Love's Old Sweet Song."

Metal and Rubber Markets

No Material Change in Steel

A steel company with offices in New York, dealing in a wide variety of steel products, reports that January business has been about two-thirds of normal good business. Steel production generally has been no better than during December, in a few cases having been less.

Steel Products Prices

Per ton—Pittsburgh—	
Bessemer billets	\$28 00 a 29 00
Open hearth	28 00 a 29 00
Forging billets	32 00 a 33 00
Sheet bars	28 00 a 29 00
Slabs	28 00 a 29 00

Sheets

The following prices are for 100-bundle lots and over, f.o.b. mill:

Blue Annealed Sheets—	
Pittsburgh base	\$2 25 a
Philadelphia	2 61 a
New York	2 63 a
Galvanized Sheets—	
Pittsburgh	4 00 a
New York	4 38 a

Finished Iron and Steel

Tank plates, Pittsburgh	\$1 45 a \$1 50
Tank plates, New York	1 83 a 1 88
Steel bars, Pittsburgh	1 45 a 1 50
Steel bars, New York	1 83 a 1 88
Iron bars, refined, Pittsburgh.	a

Iron and Steel at Pittsburgh

Skelp, grooved steel	\$1 50 a \$1 60
Skelp, sheared steel	1 50 a 1 60
Strip steel, cold	2 50 a
Strip steel, hot	2 00 a
Steel, melting scrap	14 50 a 15 00

Old Metals

The demand from consumers for aluminum and copper scrap is very slight, but dealers are not forcing any sales and the market remains quiet but steady. Lead is firm.

Following are dealers' buying and selling prices for large quantities f.o.b. cars New York:

Aluminum—		Buying.	Selling.
Cast scrap	8 a 8½	8¾ a 9	
Sheet scrap	7½ a 8	8¾ a 8¾	
Clippings	11 a 11½	12 a 12½	
Copper—			
Heavy machinery comp. ..	7¼ a 7½	8½ a 8¾	
Heavy and wire	10 a 10½	11 a 11½	
Light and bottoms	7¾ a 8	8½ a 9	
Heavy, cut and crucible ..	10¼ a 10½	11½ a 12	
Brass, casting	5¼ a 5½	6 a 6¼	
Brass, light	4¼ a 4¾	5¼ a 5½	
Brass, heavy	4¼ a 4¾	5¼ a 5½	
No. 1 cl. brass turnings. 4 a	4¼	5¼ a 5½	
No. 1 comp. turnings. 6 a	6½	7 a 7¼	
Tea lead	2¾ a 2½	2¾ a 3	
Lead, heavy	3¾ a 3¾	4¼ a 4¾	
Solder joints	5 a 5¼	6 a 6¼	

Rubber Higher

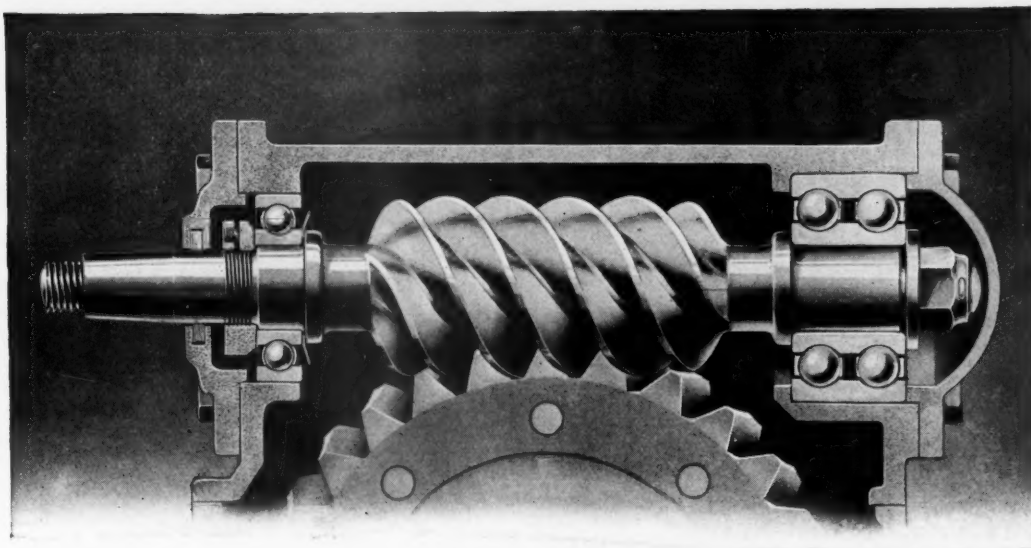
Indications pointing to a substantial recovery in the plantation rubber market were verified recently.

Paras did not share the improvement in plantations. In fact, the market appeared to be slightly easier, with little indication of buying interest.

Para—Up-river, fine	17¼ a ..
Up-river, coarse	12¼ a ..
*Island, fine	16½ a ..
Island, coarse	8 a ..
Cameta	a 7
Amber—No. 1	16 a ..
No. 2	15½ a ..
No. 3	15 a ..
Smoked ribbed sheets	16½ a ..
*Centrals—Corinto	a 10
*Esmeralda	a 10
*Mexican scrap	a 9½
*Guayule, wet	a 13
*Guayule, dry	a 26
*Balata, block, Ciudad	a 55
*Balata, block, Colombian	a 42
*Balata, Panama	a 40
*Balata, sheet	68 a 70
African—	
*Benguella, No. 2	7 a 9
*Kassal prime, black	14 a ..
*Kassal prime, red	10 a 12
*Nominal.	

SCRAP RUBBER—The rally in crude had a somewhat reassuring effect, although there was no improvement in demand or prices.

Inner tubes, No. 1	a 3½
Inner tubes, No. 2	a 2½
Tires—Automobile	½ a ¾



Deep Groove Ball Bearings on Worm Drives

THE shock of starting heavy loads, the effect of pounding over cobbles or country roads and the steady grind of miles of running are part of the daily work of worm drives.

Every unexpected bump, every impulse of the engine and every sudden stop makes its reaction felt on the bearings. In worm gears the duty of eliminating destructive effects of vibration and keeping every part permanently in place ultimately falls upon the bearings.

SKF marked deep groove bearings have proven particularly suitable to such loca-

tions, where radial and thrust loads are subject to continual variations. The bearing can withstand thrust loads in excess of its radial rating, depending on speed and load conditions. This characteristic together with the precision of workmanship and the quality of materials used, furnishes the strength and durability necessary for the most exacting service.

You are urged to make use of our engineering facilities in the solution of your bearing problems.

THE HESS-BRIGHT MANUFACTURING CO.

Supervised by **SKF** INDUSTRIES INC., 165 Broadway, New York City

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Truck and Motor Bus Equipment

(Continued from page 43)

New Turner Passenger Bus Engine

The Turner & Moore Manufacturing Co., Detroit, Mich., has in its model "H" engine an exceptionally good job for the passenger bus. It was designed with the purpose in view of long life, stability and accessibility.

It is a powerful engine for its cubic dimensions, 220.9 in., possessing speed, and shows in use, economy of fuel and lubricating oil. All reciprocating parts are balanced, assuring a smooth-running engine.

A speed of 52 m. p. h., with a two-ton load, is claimed for the job.

The engine is light in weight, and the lines of construction are of the best mechanical practice. The crankshaft and camshaft revolve in three ample-size bearings lubricated from a pressure feed pump, primed at all times.

The oil leads to crank and camshaft bearings are drilled through the crank case, eliminating rattling of tubing and loosening of soldered joints. The crankcase is provided with a tunnel cast integral its entire length. The camshaft and tappets traveling in this tunnel are submerged in oil at all times. This feature was added to the engine for the reason that cams and tappets are usually the first parts to become worn and noisy in the average poppet valve engine.

Connecting rod bearings are lubricated through oil leads drilled through the crankshaft, so all revolving bearings receive lubrication under pressure.

Tappets and valves have removable guide bushings. The valves are set on an angle with the cylinder, bringing the valve seat very close to the cylinder bore.

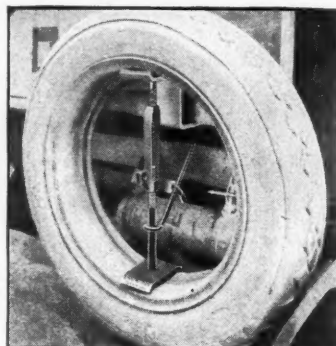
This position is stated to afford a more direct outlet to the burned gases, thus permitting a full charge of fresh gas. This valve arrangement also provides a large water space around the valves and exhaust ports.

The water cooling system is pump circulation, one of the features of which is the distribution of the water. The water circulation is such as to eliminate all hot spots and steam pockets.

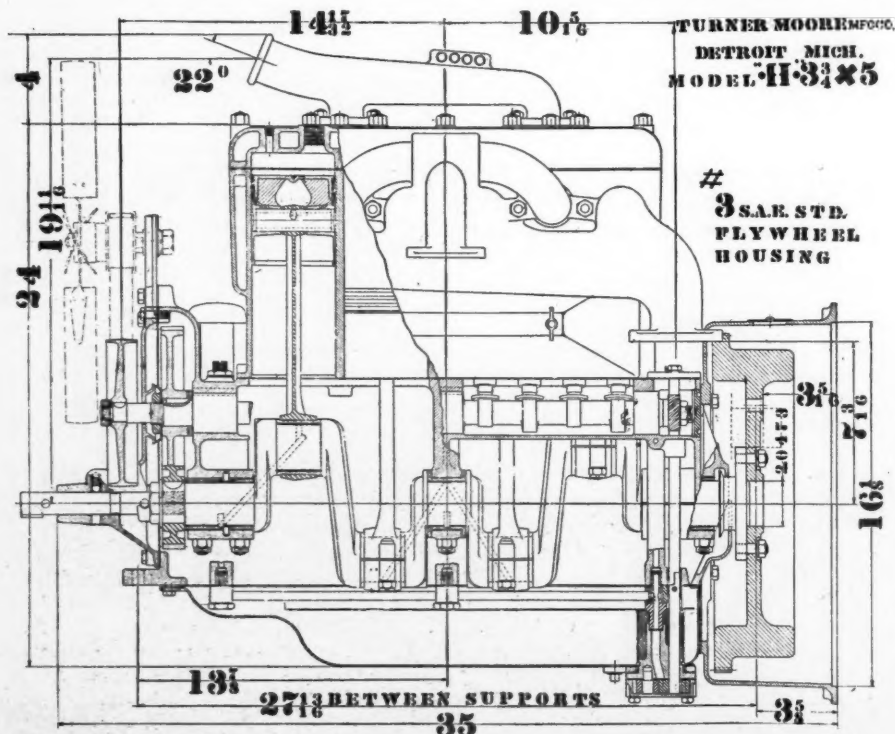
All the connecting rod and crankshaft bearings are freely accessible when the pressed steel oil pan is removed and the entire assembly of the oil pump and screen can be removed for cleaning without removing oil pan or any other part.

Greb Truck Tire Carrier

A truck tire carrier that does not touch the tire, but holds the rim and is adjustable to various sizes is being marketed by the Greb Co., Inc., 172-173 State Street, Boston 9, Mass. Its other features



Greb Truck Tire Carrier



Showing Dimensional Details of the New Turmo Bus Engine

can be summarized as follows: Protection against tire damage, locked against danger of theft, quick and easy application, and simplicity in operation.

This tire carrier is offered in the following three types:

Type A, designed for the side of trucks where the body does not overhang. It is also adaptable for dump bodies. Sizes up to 36 x 6 can be accommodated by this type. The price is \$16.

Type I, designed for the inside of trucks, where the bodies overhang wheels, or to the back of the cab. This size also accommodates sizes up to 36 x 6, and retails at \$16.

And, type J-Heavy Duty, designed for the inside of trucks where bodies overhang wheels, back of the cab, or any other attachable place. This type will carry all sizes up to 44 x 10 in. Price, \$10.

A padlock is furnished with any style, if desired, at an additional cost of \$1.

Splitdorf Brings Out Line of Improved Magnetos

Exhibited for the first time at the New York Automobile Show was the new line of magnetos recently announced by the Splitdorf Electrical Co., Newark, N. J. The new series shows an advance in the inductor type of high tension magneto, with a relative increase in efficiency and electrical output.

The new magneto is at present made in two sizes, the smaller one known as Model S and the larger one known as Model SS. The Splitdorf Model S Magneto, which is neat in design and light in weight, is being manufactured in one, two, three, four and six-cylinder types. The Model SS magneto, similar in construction to the smaller size, is particularly adaptable to larger engines of from one to twelve cylinders, inclusive, or where a spark of greater volume is required.

The Model S series has a single permanent magnet, while in the Model SS two magnets are used. The magnet or magnets are arranged with the planes transverse to the rotor axis. The effective cross-section of the magnets is the same from end to end.

The design of the rotor is particularly interesting. A through steel shaft supported on ball bearings is used. The rotating laminations are effectively fastened to the shaft by reason of being anchored in non-magnetic material which is cast under pressure around the shaft and laminations. There are several advantages in this construction, a solid shaft naturally makes a more rigid construction than one built up of several parts. The shaft is not magnetized, and some magnetic leakage is therefore eliminated. The total magnetic reluctance of the air gaps has been reduced by increasing the areas.

The frame of the magneto is an aluminum die casting. In this casting are anchored two magnet pole pieces and two coil pole pieces. The casting is made of an alloy especially developed to take care

of the differences in shrinkage and temperature. The surfaces on which rest the permanent magnets and the coil core are ground, as are also the ends of the magnets and of the coil core. This insures excellent joints at these points, which further increases the efficiency of the magneto.

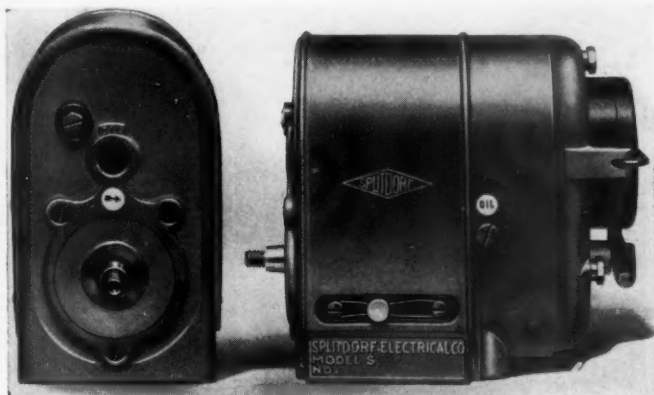
The coil core is attached to the frame by means of clamps and the area of the joints at these points is considerably larger than in previous designs. More space has been allowed for the coil, which permits even greater insulation, so that the possibility of electrical breakdown is at a minimum. Primary wires are soldered to the coil terminals, this being done to insure good contact.

has two brushes, each brush having its own set of segments.

In the Model S magneto a very simple method of fastening the spark plug cables is used. The block is moulded with depressions in both the block and cover. The spark plug cables are simply cut off

Power is first transmitted through a pair of spiral-bevel gears, which operate in a constant bath of oil, and then through a pair of spur gears to the differential and drive shafts. As the differential is combined with the second reduction set its rotation is more slow than would be pos-

Below: New Splitdorf Model S High Tension Magneto. Observe Compact and Clean Lines of Housing.



The breaker mechanism follows in general Splitdorf practice, in which the breaker bar and stationary contact point are carried on a plate which is movable for advance and retard. The breaker bar is operated by means of a cam on the rotor shaft. By having the contact points fixed it is possible to examine them while the magneto is in operation. The bearing of the breaker bar shafts is not required to take current; a pig-tail connection, one end of which is fastened to the breaker bar and the other to the magneto frame, conducts the current from the movable contact point to ground on Model S. The mica condenser, which is of standard Splitdorf pattern, is mounted on the breaker base and is carried in a metallic housing. On the face of the condenser is a card illustrating the method of adjusting the contact points. On Model SS the condenser is attached to the frame of the magneto in the distributor compartment.

The advance lever is mounted in the front cover, and by means of a short shaft and crank engages a slot in the breaker base, thereby allowing the base to be moved for advance and retard positions.

The distributor is mounted above and in the same compartment with the breaker. This compartment is closed by means of the front cover, which, when removed, provides means of examining the breaker and distributor mechanisms. The distributor disk is attached to the distributor shaft, and in the Model S magneto is provided with one segment, which contacts with the brushes in the distributor block. In the Model SS the distributor disk has a brush which contacts with segments in the distributor block, or in the case of the Model SS 2-spark the distributor disk

to the proper length, pressed into these grooves, and then onto a steel pin which pierces the insulation and contacts with the wire. The distributor block is fastened to the front cover and may be removed with it.

The insulating materials used are Americanite and Bakelite.

Special Bus Axle Included in the New Wisconsin Double Reduction Line

An addition to the line of worm-drive axles manufactured by the Wisconsin Parts Co., Oshkosh, Wis., is a recently developed double-reduction type of axle, which at present is being produced in four models of uniform design besides a special bus axle, known as model 120-K.

One of the advantages claimed for this double reduction axle is that the whole reduction takes place at the center of the axle, where all gears and bearings can be securely supported and held in alignment. Another feature is the ribbed box section of the load carrying member, which is claimed to resist any give that will tend to throw the gears out of alignment.

Phantom View of a Wisconsin Double Reduction Rear Axle.

The heavy-duty bus axle involves the same principle of construction, differing only in that the pinion shaft has been lowered to a plane coincident with the plane of the jack-shafts.



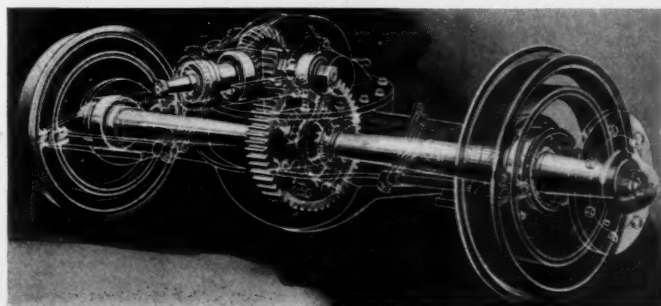
Above: Note Accessibility of Contact Point Adjustment.

sible if they were combined with first set.

These axles are of the semi-floating type and all the gears employed in their construction are forged of $3\frac{1}{2}$ per cent nickel steel. The axle drive shafts are forged from chrome nickel steel and the housing is a malleable casting. The four-pinion type differential gear used is of Brown-Lipe-Chapin make.

The new motor bus axle, which has been specially designed for motor bus and trackless trolley application, contains many features of construction for making it especially suitable for this type service. In the first place tread is larger than in the standard design, so as to provide greater stability and safety to the bus when traveling at high speed or while negotiating through crowded streets. By reason of the location of the pinion shaft, which differs from the standard design, in that it has been lowered to a plane coincident with the center line of the axle shafts, direct drive is permitted from a low hung engine and transmission, and greater top clearance is obtained, which not only makes for increased stability but allows for the construction of a low floor. The feature of accessibility to those parts requiring occasional attention has also been provided for.

The same brake system is employed on the double-reduction axles as on the company's worm drive axles. Service and emergency brakes operate in separate drums arranged concentrically on the rear wheels.



RUGGLES

A Significant Message to Dealers

YOU dealers who have definitely resolved to stay in the motor truck business—you business men who are making truck transportation your life-work—will find that RUGGLES BUSINESS TRUCKS can be a determining factor in your success.

The Ruggles organization knows that you and your public demand quality trucks. Merchandising conditions demand price. This combination of quality and price is found in Ruggles Trucks.

In designing these trucks, Frank W. Ruggles has taken full toll from his many years' experience. He builds trucks that meet the demand of the time—trucks that combine strength, finish, durability and economy in operation.

The Ruggles franchise offers organization advantages of vital importance to you.

This company was organized since the war. It has no war-time inventories—no stock of materials bought

one ton (Chassis)	\$1195
---------------------------------	---------------

TRUCKS

at peak prices. It is a company manifestly of *today*, making a product to be sold at today's logical price.

Ruggles Trucks have attained a quantity production that lowers production costs, makes possible a low Ruggles price consistent with high Ruggles quality.

The Ruggles dealership is a real opportunity for automotive dealers who believe in the motor truck industry and have the courage of their convictions.

A truck of unquestioned quality. A price unusual even in this day of declined prices. An organization of MOTOR TRUCK SPECIALISTS co-operating with you in an unusual merchandising plan. A company that is adequately financed to carry through all sales policies.

Join hands with an organization that meets your customers' demand for quality trucks at low prices. Why not sell the World's Greatest Truck Value? Write

RUGGLES MOTOR TRUCK COMPANY

SAGINAW, MICHIGAN

Canadian Factory, Ruggles Motor Truck Co., Ltd., London, Ontario



*This Emblem Stands
for Quality*

The World's Greatest Truck Values

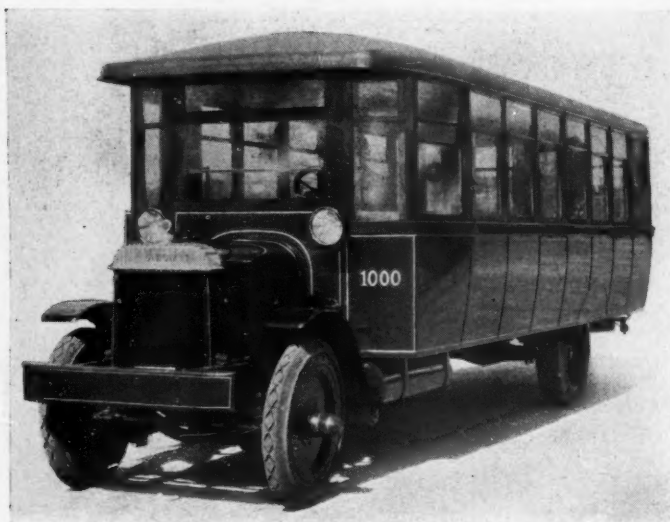
**two
ton \$1795
(Chassis)**

Use of Haskelite Airplane Panels for Motor Bus Roofs, Plymetl for Bus Sides

The motor bus, in entering the transportation field, is being re-designed and adapted for such service. Illustrative of the progress in motor bus body design, Fig. 1, shows a 25-passenger model produced by a well-known motor truck company. Prominently featured along with safety and durability, is its light weight and low center of gravity—effected through the use of Haskelite airplane plywood roofs and Plymetl side panels.

From a transportation standpoint, the practicality of these roofs was shown by their use in light weight safety cars developed by the Chicago surface lines. One of these car roofs was tested by loading with the weight of seven men. The ideal motor bus roof construction calls for the same properties in Haskelite as were developed by aircraft production; namely, lightness, dependable strength, and mouldability.

Substantial bodies result from the arched Haskelite roof which minimizes vibration and contributes to their rigidity. Being of lighter weight than the slat roof,



A Low Center of Gravity is Said to Have Been Effected in This Job by Use of Haskelite Airplane Plywood Roof

this construction lowers the center of gravity of the car, thus producing greater stability, diminishing side swaying, and lessening danger of overturn.

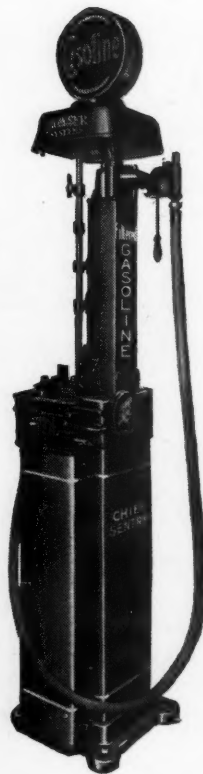
An additional feature is attractive appearance. Fig. 2 shows an interior view, illustrating the attractive paneled ceiling—easily cleaned—obtained with this type of roof. The exterior of the roof is noticeably free from the ridges and bumps, present in the slat type of construction.

Haskelite has been adapted for motor-bus sides by the application of a face of sheet steel; this product is called Plymetl. The exterior face, being of steel, is ideal for finishing; the interior face, being of wood, is readily glued and fastened to the body framework. This material is claimed to possess a splendid combination of both shock and weather resisting



New Type Spark Plug Recently Introduced by Robert Bosch Magneto Co.

It is constructed in two parts to facilitate cleaning.



Bowser's Latest Addition

The construction of this new visible pump is based on the principle of piston type measurement.

qualities. It is entirely practical to mould or form for swell sides.

It will be noted that both sides and roof panels must be mouldable. The requirement can be met with panels, especially manufactured for such usage, by the Haskelite Mfg. Corp., Chicago, Ill.

Bowser Piston-Type Visible Gasoline Pump

Of five-gallon capacity, the new Bowser pump, manufactured by S. F. Bowser & Co., Inc., Fort Wayne, Ind., is based on the principle of piston type measurement and incorporates the Bowser water separating filter which extracts all moisture from the gasoline discharge. It also has several new features of protection.

A bell announces the completion of each gallon measurement of the piston stroke. Thus the customer can check the measurement without watching the pump.

To prevent any misunderstanding between seller and buyer as to the amount discharged, large dial indicators record each individual sale.

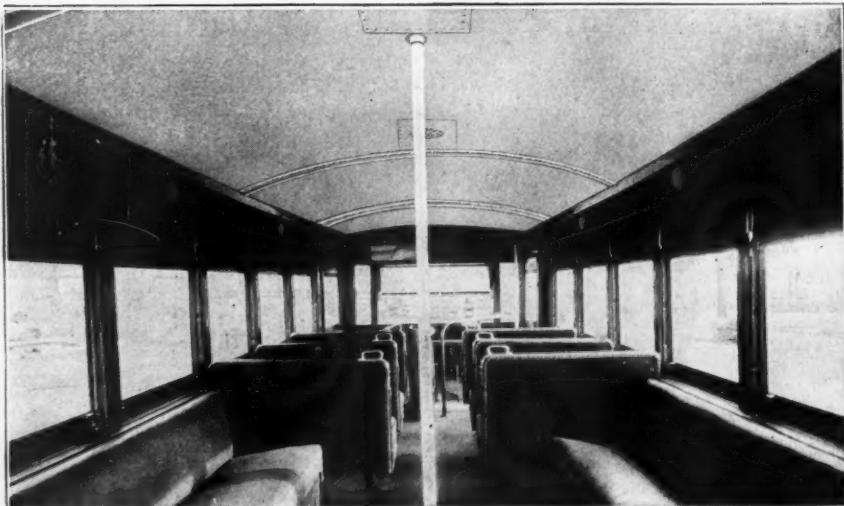
Another feature of this pump is a sight glass located in the discharge arm which permits the customer to see the gasoline both before and during discharge.

This pump is power operated by air pressure on an auxiliary cylinder which makes the power application safe in connection with gasoline. It is also arranged for hand operation. All driving parts run in oil.

Robert Bosch Spark Plug

A new type of spark plug is being offered to the trade by the Robert Bosch Magneto Co., Inc., 123 W. 64th St., New York City. It is constructed in two parts for the purpose of facilitating cleaning.

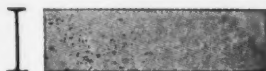
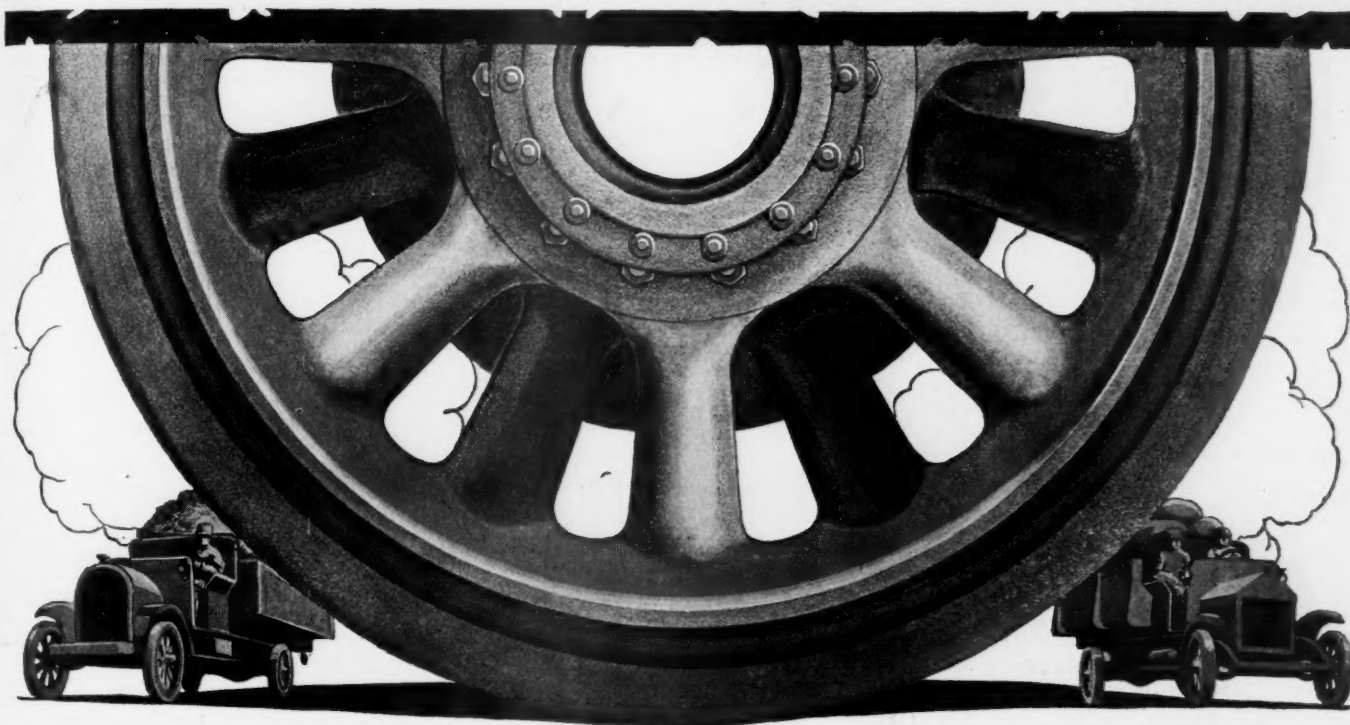
The manufacturer states that by the use of a patented valve ground seat in the upper half of the plug an absolute gas-tight fit is obtained between the body and hexagon head of the plug. The insulator known as steatite, is specified as being unbreakable. The electrodes are also made of special material. The list price is \$1.25.



Interior Showing Attractive Paneled Ceiling Obtained by the Use of Haskelite Airplane Roof

BETHLEHEM

ROLLED STEEL TRUCK WHEELS



The specially-rolled I-beam from which the wheel is made.



The spokes are outlined. Each half of the I-beam produces a wheel.



The spokes are grooved and staggered to furnish lateral strength.



The ends of the beam are bent through an angle of 90°.



Hub spacer is inserted, the wheel bent to shape, welded and finished.

FEATURES THAT MAKE THIS TRUCK WHEEL UNIQUE

In the first place, it is made of *rolled steel*.

It has the tremendous strength of rolled steel—strength far exceeding service requirements.

And it has the lightness of a wood wheel.

The spoke ends form an interlocking “keystone” hub construction—compact—simple—strong.

It has the interesting combination of attractive appearance—clean-cut, distinctive, suggestive of rugged strength—and attractive selling price!

The attractive selling price results from quantity production—plus the economies peculiar to the manufacturing process.

The actual making of the wheel from a specially rolled steel I-beam—the rolling of this I-beam by an exclusive Bethlehem process—the selection of the steel—even the mining of the ore—every step, in fact, in the production of a Bethlehem Rolled Steel Truck Wheel, is planned and carried out by the Bethlehem organization.

Manufacturers who aim to install on their trucks a product of outstanding superiority will find it profitable to investigate fully the Bethlehem Rolled Steel Truck Wheel.

Send Today for Catalogue RC

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.



Sales Offices: New York
Boston

Philadelphia
Baltimore

Washington
Atlanta

Pittsburgh
Cleveland

Detroit
Chicago

St. Louis
San Francisco

Personal Items

J. H. Brooks has accepted the position of sales manager of the Automotive Accessory Dept. of the Bridgeport Brass Co., of Chicago. For the past eight years he has been special representative of the American Chain Co.

William J. Cleary has been made assistant general sales manager of the Sharon Pressed Steel Co., of Sharon, Pa., his headquarters being 1214 Dime Bank Bldg., Detroit. Mr. Cleary's former connections have been with the Studebaker Corp. and the Willys Corp.

J. J. Davis has been announced as sales manager for San Francisco of the Reo Motor Car Co., the appointment having been made by P. L. Emerson, president and general manager of the company.

Robert T. Day has been appointed general sales manager of the Edward R. Ladew Company, Inc., with headquarters at 430 Broadway, New York. The company manufactures Hoyt's Flintstone belting and other leather products.

H. G. Evans is the new advertising manager of Winther Motors, Inc., Kenosha, Wis. For four years he has been acting in various sales and service capacities with the company and a previous wide and diversified advertising and sales experience qualifies him to assume the important duties of his new position.

L. L. Evans, who for the past five years has been with the Firestone Tire & Rubber Co., has directly associated himself with the Ross Walton Tire Co., Eastern distributors for Oldfield tires, and will supervise commercial account sales.

Roland Gerry, a director of the Jones & Laughlin Steel Co., and manager of sales of the cold-rolled department, has been advanced to the position of special sales representative of the company for the United States and Canada. He is a member of the S. A. E.

Clifford S. Gill has returned to the Vim Motor Truck Co., of Philadelphia, as manager of the New York branch. Mr. Gill was formerly identified with the company as district representative in Cleveland.

Charles W. Hadden, manager of Foreign Sales for the Minneapolis Steel & Machinery Co., of Minneapolis, has resigned his position with that company, to become assistant to the president for the Maxwell Motor Corp.

Henry J. Hall, Jr., formerly vice-president and general manager, and C. M. Addis, formerly service manager, of the New York Lubricating Oil Co., announce their association with the National Lubricants Co., 135 Broadway, New York City.

Hal Holtom, of Holtom & Spring, Detroit, is responsible for the engineering design and construction of the Sterling Model, latest product of the Standard Steel Car Co., of Pittsburgh, Pa. Mr. Holtom is a British automotive executive, having been largely responsible for the motorization of the Russian Imperial transport and the development of the British subsidy type truck.

J. J. Kennedy will take charge of the sales organization of Bell Manufacturing Co., 11 Elkins St., Boston, Mass., manufacturer of Timers for Fords. He will act in the capacity of sales manager.

John S. Krauss, treasurer of the L. H. Gilmer Co., of Philadelphia, Pa., has been elected vice-president and general manager of that company. Joseph S. McCulloch, president of the Union National Bank, was named to succeed Mr. Krauss as treasurer.

A. C. Bergmann, for the past two years general sales manager of the Sterling Motor Truck Co., of New York, Inc., has resigned to join the C. G. Spring Co., of Kalamazoo, Mich.

Thomas H. Lavier, Jr., has been elected president of the Ray Battery Co., Ypsilanti, Mich. He is the inventor of Lavier formula plates used in Ray batteries.

F. H. McKinney has been appointed truck sales manager of the Packard Motor Car Co., of Detroit.

Harry Barrett Marshall, well known in automotive electric circles, has been placed in charge of all railway sales work of the Electric Storage Battery Co., with headquarters in Philadelphia.

Kenneth B. Miles has been selected by C. L. Crippen, district manager of the United States Tire Co., as new branch manager at the Cincinnati office. Mr. Miles succeeds Sidney Wright, who died a short time ago.

John V. Mowe, general sales manager of the Kelly-Springfield Tire Co., was elected vice-president of that company. Mr. Mowe joined the company in 1915 as assistant general sales manager.

H. A. Neill, for the last five years manager of the Philadelphia branch of the General Motors Truck Co., has been transferred to the factory sales staff. F. B. Tyler succeeds him at Philadelphia.

S. X. Newman, who recently severed his connection with the Automatic Safety Tire Valve Corp., has been appointed director of sales for Edward V. Hartford, Inc., 35 Warren St., New York City, manufacturer of shock absorbers, spring bumpers and auto jacks.

F. M. Root, formerly with the B. F. Goodrich Co., Chicago branch, has recently taken over the management of the Chicago branch of the Victor Rubber Co., of Springfield, O., his quarters being at 1720 South Michigan Ave.

John F. Shaunessy has become affiliated with the Chicago Motor Truck, Inc., 335 West 28th Pl., Chicago, Ill., as sales manager.

John F. Toole has established Western headquarters for the Yellow Cab Mfg. Co., Chicago, Ill., at San Francisco, Calif. He will have charge of all territory lying between Salt Lake City and the coast.

G. A. Watson, formerly sales manager of the Western Motor Supply Co., of Minneapolis, has joined the Multibestos Co., of Walpole, Mass., to act in the capacity of district manager in charge of sales for the States of Iowa and Nebraska.

Removals and Trade Changes

The Victor Screw Works, manufacturer of Victor bright forged products, and the Peninsular Milled Screw Co. have effected a consolidation under the name of the Victor-Peninsular Co. After March 1 the company will be in its new factory at Hancock and Lawton Aves., Detroit, Mich.

The Anderson Electric and Equipment Co., of Chicago, manufacturer of AutoReelite, has been purchased by the Appleton Electric Co., also of Chicago. The latter firm recently moved into its four-story building at Wellington Ave. and Paulina St. The new quarters afford 146,000 sq. ft. of floor space.

The Metal Specialties Manufacturing Co., 338 N. Kedzie Ave., Chicago, is now producing the Jorgensen Vapor Primer, formerly manufactured by the Jorgensen Mfg. Co., Waupaca, Wis. This primer is now standard equipment on several makes of trucks, as well as passenger cars and tractors.

The Sterling Motor Truck Co., Philadelphia branch, moved its sales and service rooms to new and larger quarters at 137 North 22nd St.

The Sterling Metal Products Co., of Racine, Wis., has acquired the assets of the Splitex Radiator Co., also of Racine.

The Cleveland Rubber Corp. has moved its Cincinnati location to a new home at West Seventh St. The branch, which will operate under the name of the Big B Tire Co., will cover the entire Southern Ohio district.

The Equipment Service Co., of St. Louis, Mo., has moved into new quarters at 2322 Locust St. The organization has the agency for various lines of equipment in Eastern Missouri and Southern Illinois.

The Victory Motor Car Co., of Marion, O., who recently took over the selling franchise for Maxwell passenger cars and trucks, has leased a new building at 178 North State St., which will greatly improve their selling and service facilities.

The McKay-Grubb Rubber Co., Minneapolis, Minn., automotive jobber, has moved from 1110 Hennepin Ave. to more commodious quarters at 1221 Harmon Pl.

The William M. Moore Co., Inc., has changed its name to the General Tire Co., of Philadelphia, Inc. Announcement is made of the withdrawal of William M. Moore from the firm. J. R. Baltz remains as president.

New Agencies

The Fidelity Motors, Inc., 4330 Market St., Philadelphia, Pa., has secured selling rights for Bessemer trucks and will distribute in the Philadelphia territory. Service for this company will be furnished by the Automotive Co., under the personal supervision of Ray E. Jacoby.

The General Motors Truck Co., of Pontiac, has opened a direct factory branch for distribution in the Southeastern States at Atlanta, Ga. This branch will take the place of the Southeastern GMC Truck Co., who has been the distributor in this territory.

The Ahlberg Bearing Co., Chicago, has opened additional branches at Baltimore, Buffalo, Columbus, Dallas, Duluth, Indianapolis, Newark, Toledo, Washington, D. C., and Cleveland, thus making a total of 34 branches owned and operated by the company.

Foshay's, 21 Wheeler Ave., Pleasantville, N. Y., announces that it is offering automotive equipment at wholesale in the territory of Westchester County, Putnam County and Rockland County.

Literature

The New York Edison Co., 130 East 15th St., New York City, has prepared for distribution a hand-book showing automobile routes and charging stations in the vicinity of New York for electrical vehicles. There are also eight pages of information on the maintenance and operation of electric vehicles and on the care and charging of storage batteries. Free on application.

The Autocar Co., Ardmore, Pa., has offered to the public an attractive little booklet on the use of Autocars in highway construction. The work demonstrates the adaptability of these trucks to various requirements of road building and contains a number of items and illustrations of interest to highway contractors.

The Waterhouse Welding Co., 15 Pelham St., Boston 18, Mass., has issued a piston pin and ring specification booklet for all makes of passenger cars, trucks, motorcycles and motors.

The McKay Carriage Co., Grove City, Pa., has issued two very complete catalogs on bus, school and commercial bodies. One catalog is devoted to the bodies that can be installed on Reo Speed Wagons. The photographs and descriptions are particularly good and the work as a whole makes attractive sales literature.

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